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Frontier Unlimited

In the early days of this country, the abundance of natural resources gave constant stimulus and vitality to our developing economy. With a system of government that encouraged individual award for enterprise, hardy, venturesome people pushed through the wilderness in search of nature's bounty. In their wake they left budding industrial cities and prosperous agricultural communities. Always there was a frontier—and behind that frontier was the prosperity that resulted from its development.

But free land, thick forests, and rich mineral deposits could not last forever. By 1900, frontiers based upon natural resources were diminishing. If America's growth was to continue, a new type of frontier would have to be found.

Fortunately, one was in the making. The same system of enterprise that caused the development of land resources also encouraged the development of the native ingenuity and talents of our people. People were turning to science and technology to find opportunities. Invention paid as well as discovery of mineral deposits, and technical improvements gave the same stimulus to industry and commerce. Mass production was born, and the research laboratory came into being. Organized technology and scientific research became the new frontier for America's progress.

With the research laboratory feeding and sustaining our economy, free enterprise has reached its highest capacity for public good. In a few decades, we have developed from an agricultural nation to the world's industrial leader. Our people have come to regard as necessities what others consider unattainable luxuries. We recognize no limits to the abundance of the life we live, simply because we see no limits to the things that can come from our laboratories.

The pace of our progress from one decade to the next has been amazing. In 1940, for instance, we thought we had reached a fabulous level of production and wealth as a nation. Today, however, we produce more than twice the electrical energy we did in 1940, five times the amount of aluminum, and nearly twice the tonnage of steel. In addition, we now have a synthetic rubber industry with a capacity nearly as great as the maximum amount of natural rubber ever produced in all the world in any one year, and an output of man-made fabrics twice as large as our 1940 wool production. In the same period, a huge plastics industry was developed, and in the later part of that period the television industry came into being.

Research, itself, is a two-billion dollar business today, and one that is growing at an exponential rate. Every year, at increasing rate, we are finding out how to do more things with the resources we have—how to build more industries, to create more jobs, and produce more goods for our people to use.

Our new frontier knows no limit. It challenges exploitation.

Clyde Williams

Director, Battelle Memorial Institute

Automatic Data Processing . . .

A New Tool for Management

by ROGER L. MERRILL

The author has been engaged in research and development of complex electrical systems throughout his professional career. He first became interested in electrical computers while doing graduate work at the Ohio State University. As a research engineer in industry, he developed several valuable applications for electrical systems. He now is engaged in similar research at Battelle.

THE amazingly rapid development of electronic computers over the past several years has left nearly everyone a little breathless. Machines that perform 5000 additions in one second or consult a table of functions in 1/1000 of a second are no longer considered exceptional. Computers have already been used in vast accounting operations to do the work of a small army of accountants and clerks—and do it more accurately[1]. An electronic library has progressed beyond the proposal stage. Electronic language translators and even an electronic stenographer have been proposed[2].

Electronic Computers in the Future

Just what practical applications of these so-called "mechanical brains" can be expected in the immediately foreseeable future? Most computers developed to date have been designed for application to scientific research. Already they have had a profound effect on research and development in astronomy, atomic energy, guided missiles, aircraft, ordnance, logistics, and many allied subjects. There can be little doubt that their usefulness in scientific fields will increase as new technological advances occur and as methods of using them become more fully and more widely understood.

Recently, there has been a trend toward the development of relatively small, inexpensive computers. In general, these machines are designed to achieve near-optimum efficiency in handling a particular class of problems[3]. Some of the smaller machines can handle general problems—usually at the sacrifice of some of the automatic features of their larger cousins. The development of smaller computers, which any medium-sized industry or research laboratory can afford, will certainly continue at an increasing rate.

The principal advantages of electronic computers is the incredible speed with which they can process completely a given set of data in accordance with a prescribed program. They are actually complete information-processing systems and usually include the following functional units:

Unit	*Function*
Input	Inserts original data and instructions into the system.
Arithmetic	Performs actual computations.
Storage (Memory)	Stores original data, intermediate results, instructions, function tables, etc.
Control	Sequences the various operations of the computer.
Output	Records the results of the computation.

Scientific computations are characterized by a relatively small quantity of original data which require numerous arithmetic operations to process. Much emphasis has been placed on the high speeds computers achieve in performing the arithmetic function.

Computers in Business—Automatic Data Processing

The speed with which computers perform other functions, however, has tremendous implications in the business field. Immense quantities of data are generated in the operation of any business, be it a manufacturing plant or a retail department store. Unfortunately, these data in their raw form are not very useful. No individual can possibly grasp this mass of data and deduce the trends significant to management. The accountant's cost analysis may be a useful management tool but may lose much of its value during the month required for its preparation. The higher the level of management, the greater the need to reduce data quickly to a form which reveals significant facts. Electronic data-processing systems have the ability to digest vast quantities of raw data in accordance with a long and involved program of operations, and to prepare the necessary reports for management with a minimum of human intervention.

Intensive efforts are being directed toward the development of completely automatic data-processing systems for business use. It is now technically possible,

and the need is great. There have been few basic developments in office machinery in the past fifty years. In the meantime, the volume of office work has increased by leaps and bounds. Much of the drudgery of office work must surely be supplanted by automatic equipment. It has been predicted that the arrival of automatic data-processing systems will signal the beginning of "the second industrial revolution."[4]

The trend toward smaller electronic computers indicates that the development of large, complex, and expensive automatic data-processing and accounting systems will be accompanied by a parallel development of smaller, simpler, special-purpose systems. These systems will be capable of serving the data-processing needs of small businesses. They may also eventually serve as input devices to the larger systems or handle complex, specialized problems which are independent of the main data-processing system.

Automatic Statistical Quality Control

Typical of the small data-processing systems are the statistical quality-control computers which have recently been developed.[5-6] These systems perform all of the calculations required for the statistical control of product quality and display the results in the form best suited for use by management. They are often associated with electronic gages which automatically measure the desired quality characteristic. The laboratory model of such a data processing system is shown in Figure 1.

Figure 1. ***Laboratory Model of Automatic Statistical Quality-Control Equipment Developed for the Packaging Industry.***

In high-speed production industries, the problem is seldom to obtain sufficient data regarding the cost or quality of the product. Rather, the problem is to properly interpret the data so that a control decision can be made in a minimum of elapsed time. Statistical quality control actually arose out of this need for more efficient methods of processing data. Unfortunately, however, many industries have avoided sound statistical quality-control programs because the additional labor required is considered too costly. Simple data-processing equipment can overcome this difficulty.

What Is Statistical Control?

There will always be variations in the quality of manufactured products. Figure 2 shows the variation in weight of 399 packages produced on a modern package-filling line. This grouped frequency distribution illustrates one method of reducing a large quantity of data to meaningful form. It is prepared by dividing the total range of weight variation into intervals. The ordinate of each point on the diagram represents the number of packages having weights within that interval.

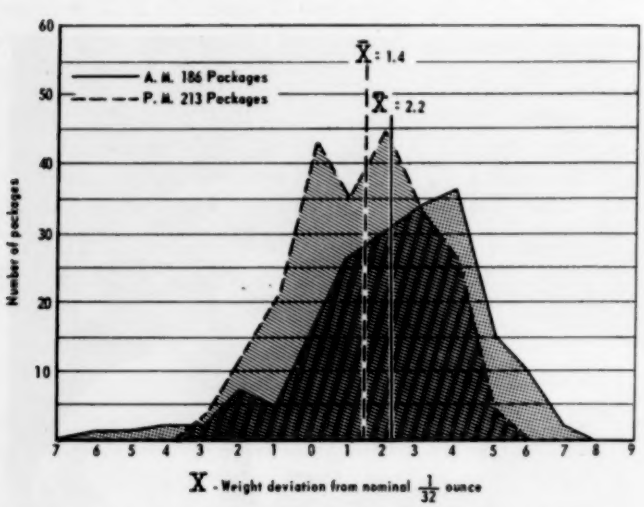

Figure 2. ***Grouped Frequency Distribution Presents Package-Weight Data in Meaningful Form.***

This distribution can be described approximately by two statistics—the average value, X, and the standard deviation, σ. The standard deviation is the root-mean-square of the weight deviations about the average and is a measure of the spread of the distribution.

The dotted curve in Figure 2 is a "normal" distribution which has the same statistics, X and σ, as the distribution of package weights. It is a mathematical curve completely defined by the values of X and σ. Definite statements can be made about the normal curve which are of tremendous value when applied to the control of weight variations. If the deviations in package weights closely follow a normal distribution, approximately 68 per cent of the weights will be between X $\pm$ σ; 95.5 per cent will be between X $\pm$ 2 σ; and 99.7 per cent will be between X $\pm$ 3 σ—*provided the manufacturing process does not change.*

This particular process, however, does change. The packages were actually produced in two nearly equal groups separated by an interval during which several thousand packages were filled. The weight distributions for each of the groups are shown separately in Figure 3. The distribution in Figure 2 is simply the sum of these two distributions.

Figure 3 clearly shows a significant shift in the average weights of the two groups. The shift in X reveals that a systematic or long-term (assignable) change in the filling process has occurred. The standard deviations (spreads), on the other hand, do not appear to be significantly different. This indicates that the normal pure-chance variations in the process

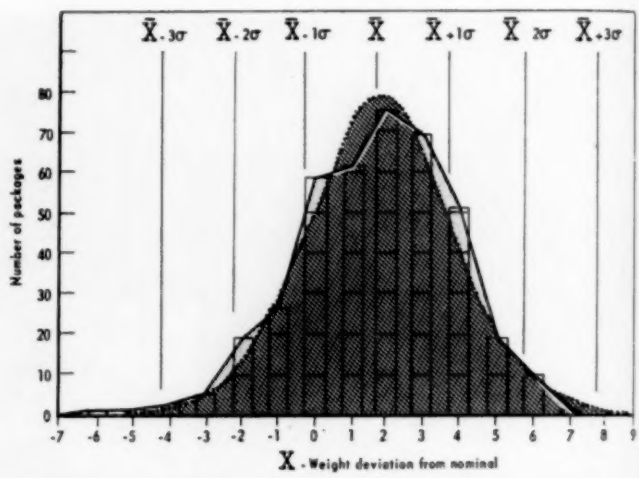

Figure 3. ***Weight Distributions for Two Groups of Packages Produced at Different Times, Reveal a Significant Shift in the Average Weights.***

that occur between consecutive packages or during the production of a few packages are statistically stable.

Statistical quality-control techniques provide methods of differentiating between systematic (assignable) variations in the process that can be controlled, and normal pure-chance variations that cannot be controlled. The ability to distinguish between assignable variations and normal pure-chance variations is the principal requirement for an effective statistical quality-control system. The earliest possible indication of an assignable variation is necessary in order to accomplish the greatest improvement in product quality.

Automatic Control Charts for Variables

One of the most effective statistical quality control techniques is the use of control charts for variables.

Control charts for variables are applicable to those products for which it is possible to obtain a quantitative measure of the quality characteristic (package weight, for example) to be controlled. Samples (often five) of consecutive items are selected from the production line, and the particular quality characteristic is measured on each item in the sample. The average value and the range (the difference between the largest and smallest) are calculated and plotted on appropriate charts. The range is related to the standard deviation and also is a measure of the normal variation in the production process. Other statistics, such as the standard deviation, may also be used to plot control charts.

As they are plotted, the statistics are compared with predetermined control limits. A sample average which exceeds the control limits for averages indicates the likelihood of a shift in the process average. Similarly, a sample range or standard deviation outside the control limits indicates the likelihood of a change in the normal variation of the process. Either event is a warning of possible trouble in the production process.

Figure 4 shows package-weight control charts (X and σ) for a well-known breakfast cereal. The dashed lines represent statistically determined control limits. The control chart for averages indicates definite trends in the process-average greatly in excess of the variation which might normally be expected. The chart for σ indicates that the normal pure-chance variations

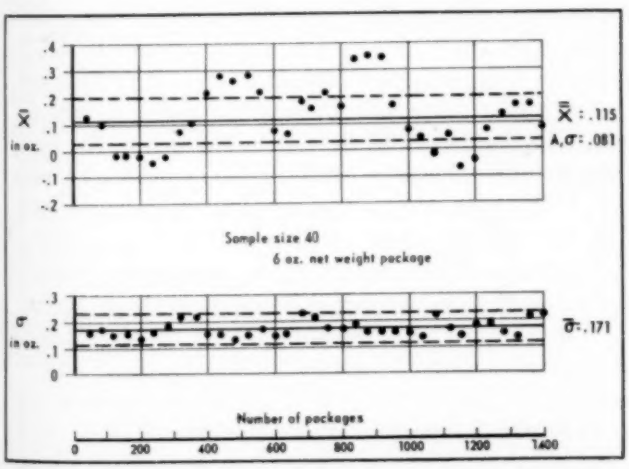

Figure 4. ***Package-Weight Control Charts Clearly Show an Undesirable Variation in the Process Average While the Pure-Chance Variation Is Statistically Stable.***

of the process are relatively constant. The unusually large sample size of 40 is made practical only by the use of automatic data-processing equipment.

The simplified block diagram of a data-processing system for the automatic preparation of control charts for variables is shown in Figure 5. This system has recently been developed for the control of weights in the packaging industry[6]. The equipment accepts signals, representing weight deviations, from an automatic electronic scale. Simple electronic computers determine the average weight and the weight range of samples of consecutive packages. The values of X and R are recorded on strip-chart recorders to form the control charts. A selector switch on the computer permits the size of the sample (between 5 and 50 items) to be preselected. The high operating speeds of the scale and the computing equipment normally permit the weight data from every package produced on a single production line to be included in the analysis.

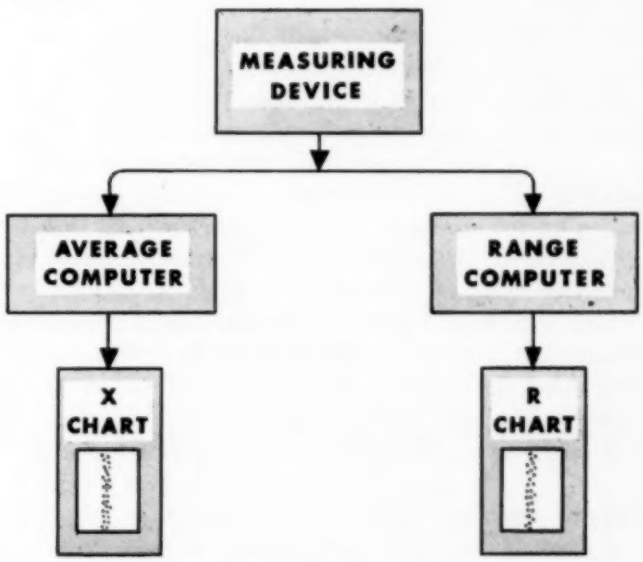

Figure 5. ***A Data-Processing System for the Automatic Preparation of Statistical Quality-Control Charts.***

The system has been extended to provide a warning indication whenever the control limits are exceeded, and a meter to indicate the direction and amount of correction required to bring the process average into control. A laboratory model of the equipment is shown in Figure 1.

Automatic statistical quality control has proven itself to be extremely valuable in the packaging industry. It eliminates the need for manually selecting a sample of packages, weighing them, recording the weights, computing the statistics, and plotting the results. It can process a much greater quantity of weight data faster and more accurately than is economically possible with manual methods.

Conclusions

Statistical quality-control computers illustrate only one field of application for small data-processing systems. The potential applications of electronic computers and instrumentation to business and industrial

problems are almost limitless. Within the next few years, large data-processing systems now under development can be expected to take their places in accounting systems and to provide management with adequate, up-to-date cost information. Small, specialized, data-processing systems will also continue to be developed to assume many of the routine data-recording and processing jobs which may not be directly related to the larger accounting systems.

Automatic data-processing systems are providing management with the tools—and management is beginning to use them to supervise and control business operations more efficiently than ever before.

[1] "New Frontiers in Business Management Control Are Being Established by Electronic Computers," H. D. Huskey and V. R. Huskey, The Journal of Accountancy, January, 1952, Vol. 93, No. 1, pp. 69-75.

[2] "Giant Brains," Edmund C. Berkeley, John Wiley & Sons, 1949.

[3] "Maddida—Digital Differential Analyzer," Brochure No. 38, Northrup Aircraft, Incorporated, Hawthorne, California, December, 1950.

[4] "Office Robots," Fortune, January, 1952, Vol. XLV, No. 1, pp. 82-87, 112-118.

[5] "Quality-Control Indicator," R. C. Miles, Mechanical Engineering, March, 1950, Vol. 72, No. 3, pp. 221-224.

[6] "Automatic Statistical Control Saves on Package Overfill," Roger L. Merrill and William Hecox, Food Engineering, May, 1951, pp. 55-59.

[7] For a more complete discussion of statistical quality control, see "Statistical Quality Control," E. L. Grant, McGraw Hill, 1946.

☼

Steam is no stronger now than it was a hundred years ago, but it is put to better use.—*Ralph Waldo Emerson.*

☼

The introduction of noble inventions seems to hold by far the most exeellent place among human actions.—*Francis Bacon.*

Industrial Agriculture

by K. STARR CHESTER

The author is an internationally recognized expert on plant viruses. As a teacher and research director, he has pioneered the new thinking that relates plant and animal health to soil fertility. His professional activities are numerous and diverse. They include, among others, membership on the Board of Governors of the National Farm Chemurgic Council, chairmanship of the Board of Directors of the National Flying Farmers' Foundation, and chairmanship of the UNESCO International Commission for the Study of Plant Diseases.

AGRICULTURE is our oldest and greatest industry. On more than a billion acres of farm land, the farmers of the United States are producing crops and livestock valued at 38 billion dollars annually, bringing them one-tenth of the nation's income. Much of this income, of course, supports those industries that furnish the farmer with equipment, agricultural chemicals, transportation, insurance, and his many other needs.

For example, the American farmer buys 685 million dollars worth of lime and fertilizer, 1.25 billion dollars of implements and machinery, and nearly 1 billion dollars worth of building materials annually. He carries 17 billion dollars worth of fire insurance, and consumes in a year six billion gallons of motor fuel in his 8.5 million tractors and automobiles.

The farmers of Ohio, Pennsylvania, and Kentucky alone receive nearly 3 billion dollars a year in cash and value of produce for this own use. Farmers' cooperatives in Ohio do an annual business of 474 million dollars and those of Pennsylvania, 178 million dollars.

Farm income has more than tripled since 1938. Farm mortgages have decreased 49 per cent in fifteen years. Farm leaders seem convinced that some form of farm price support is here to stay, so do not fear the agricultural depressions of the past. Investments in agriculture have promise of greater security than can be said for many other industries.

The rising ability of American agriculture to meet national and international needs for farm products has been possible only through heightened efficiency in production. This high efficiency is a major element in the fact that one hour of labor of a factory worker in the United States can buy twice as much food as in England, seven times as much as in Russia. In 1920, one American farm family could feed itself and 12 other persons. Today it can feed itself and 20 other persons. Six per cent of the United States population, one-third of those who live on farms, are providing between 80 and 85 per cent of the country's food crops.

This miracle of production rests on modern agricultural sciences. One branch of that science has given us farm mechanization which now replaces 12,000,000 horses, competitors of man in food consumption. One man with a good tractor and a three-bottom plow can turn as much land as six teams of horses, each with a plow and operator. One machine can pick as much cotton as forty to fifty field hands.

Another branch of agricultural science has given us a host of new and powerful chemicals for crop and livestock protection. The new chemical, 2,4-D, usually applied by airplane, is being used to keep down the weeds on many millions of acres. Potent new insecticides and fungicides are revolutionizing the control of pests and diseases of crops and livestock. Other new chemicals are succeeding in disinfecting soil, regulating the growth of plants, and removing the leaves that interfere with mechanical harvesting.

In the same fashion, the fertilizer industry, through such innovations as more concentrated fertilizers and new forms of old materials, has made possible greatly increased farm production.

Lately agricultural research has proved that poor crop development is often caused by deficiencies of such "trace elements" as copper, boron, zinc, and magnesium. These are needed in very small amounts, only a few parts in a million of soil, but they are vital to the healthy growth of crops. Even in areas where no trace mineral shortages had been suspected, crop yields and values have been materially increased by use of these substances in fertilizers. This represents both an opportunity to increase crop production and a sizeable new market for the fertilizer industry and for producers of trace elements.

Still another branch of agricultural science has given us new varieties of crops and new breeds of livestock that are more efficient and productive than the older ones. Often the newer crops are resistant to diseases that formerly caused devastating crop losses.

An outlay of 200 thousand dollars a year in research has resulted in better wheat varieties that outyield old varieties by 10 to 30 per cent, and give a continu-

ing return of 50 million dollars. The scientific studies that lead to hybrid corn have increased American corn production by ¾ billion bushels per year. The introduction of soybeans to the United States, another research achievement, is adding a half-billion dollars to farm income with more millions coming from soybean processing.

The research that has made these advances possible is costing less than half of one per cent of the gross value of farm products. Percentagewise this is small in comparison with the amounts invested in research by many other American industries. The U. S. agricultural research budget is about 150 million dollars, of which two-thirds is expended in tax-supported state and federal experiment stations, and the remaining third in the laboratories and on the experimental farms of the industries that serve agriculture or of research institutes such as Battelle.

In spite of the contribution science and technology have made to the miracle of modern agricultural production, we still have far to go before we reach the limits of this production. There are still many unanswered questions as to how best to use our heritage of soil most efficiently and yet prudently, so that it will serve the generations yet to come.

A prosperous and productive agriculture, of course, has more than local significance. Each day there are an added 6000 hungry souls in the United States, 50,000 more in the world each day, 20 million more each year. Social unrest and wars stem from hunger. Each forward step that science enables agriculture to make is a step toward national security and world tranquility.

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Science advances not by the accumulation of new facts—a process which may even conceivably retard scientific progress—but by the continuous development of new and fruitful concepts. —*James B. Conant.*

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The real problem in the years ahead is one of making the most efficient use of all our national resources—and not the least of these resources is our intelligent youth.—*George A. Sloan.*

BATTELLE TECHNICAL REVIEW ABSTRACTS

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ORE AND MATERIAL BENEFICIATION 61a
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PHYSICS 114a
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POLLUTION AND WASTES 88a
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Polymerization; properties; testing; processing methods and equipment; compounding.

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Natural resources; supplies; production and cost data; articles on economic trends.

BATTELLE TECHNICAL REVIEW
ABSTRACTS

Volume 1, Number 2 February 1952

1. ORE AND MATERIAL BENEFICIATION

1088* Notes on Precision and Accuracy of Optic Angle Determination With the Universal Stage. H. W. Fairbairn and T. Podolsky. *American Mineralogist,* v. 36, Nov.-Dec. 1951, p. 823-832.

Stresses the importance of optic angle work in drawing correct petrologic conclusions. Discusses methods and gives tabulated data.

1089* Apparatus for the Separation of Mineral Grains. F. E. Senftle. *American Mineralogist,* v. 36, Nov.-Dec. 1951, p. 910-912.

Describes, diagrams, and evaluates the above apparatus for use in microscopic examination of minerals.

1090* Pilot Plant Investigations on Cold Water Separation of Bitumen From Alberta Bituminous Sands. L. E. Djingheuzian. *Canadian Mining and Metallurgical Bulletin,* v. 45, Jan. 1952, p. 2-15; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 1-14.

Gives details on Canadian Bureau of Mines research on above problem—of great importance in connection with the possible utilization of the northern Alberta bituminous-sand deposits. Equipment is illustrated; data are tabulated. Includes flow sheets. 11 ref.

1091* Metallurgical Practice at Golden Manitou. D. A. Livingstone. *Canadian Mining and Metallurgical Bulletin,* v. 45, Jan. 1952, p. 16-26; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 15-25.

Golden Manitou Mines, Ltd., 9 miles east of the town of Val d'Or in northwestern Quebec, is presently milling, at the rate of 1000 tons daily, a relatively complex sulfide ore and producing, in decreasing order of value, Zn, Ag, Au, Pb, and Cu. The products are a Zn concentrate, a Pb-Ag-Cu concentrate, and Ag-Au precipitate from cyanidation. Flow-sheet developments from the commencement of operations in 1942 are dealt with briefly, showing the reasons for making numerous changes, the shortcomings of the various schemes tried, and finally, data pertinent to present-day practice.

1092* Laboratory Tests of the Cleaning of Fine Coal by a D. S. M. Cyclone. T. E. Morimoto. *Canadian Mining and Metallurgical Bulletin,* v. 45, Jan. 1952, p. 40-48; disc., p. 48; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 39-47; disc., p. 47.

The Research Council of Alberta has made a series of tests with the cyclone washer to investigate the influence of the following operating variables: underflow apex diameter, specific gravity of medium, pulp ratio, density distribution of the feed, and size analysis of the feed. Results obtained for all the variables except the latter are included. Equipment is described, diagrammed, and illustrated; data are charted and tabulated.

1093* The Aqueous Oxidation of Pyrite. James F. Stenhouse and W. M. Armstrong. *Canadian Mining and Metallurgical Bulletin,* v. 45, Jan. 1952, p. 49-53; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 48-52.

The above in caustic solutions under oxygen pressure was investigated by measuring the effect of reaction variables on O_2 consumption by the reactions. From the results, a model for the process is proposed. Application to leaching of sulfide ores is suggested.

1094* Titanium—A Critical Review With Special Reference to the Utilization of South African Resources. J. J. Frankel, A. M. Schady, and D. J. Du Pleissis. *Journal of the Chemical, Metallurgical & Mining Society of South Africa,* Sept. 1951, p. 39-52; disc., p. 52-57.

Surveys the location and nature of overseas titanium deposits, methods of processing the ore, and new metallurgical developments. Against this background, the possible utilization of South African Ti resources is discussed. 66 ref.

1095* Poor Aggregate Deposits Made Useable by Sink-Float Refining Process. James F. Lynch, Jr. *Civil Engineering,* v. 21, Dec. 1951, p. 41-43.

Describes the application of Heavy Media Separation process for gravel beneficiation.

1096 How Difficult Anthracite Is Prepared by Dual-Density Cleaning. H. J. Daniels and Harold Davis. *Coal Age,* v. 57, Jan. 1952, p. 90-93.

Describes a new dual-gravity, heavy-density unit that yields near perfect results with hard-to-clean feed at Indian Head Coal Co., Tremont, Pa. Diagrams and illustrations.

1097* The Flocculation of Coal/Clay Dispersions. Part 2. J. O. Samuel. *Journal of the Institute of Fuel,* v. 24, Nov. 1951, p. 238-247.

Describes experiments on slurry formation in the wet classification of British coals and its control and recovery by a flocculation and filtration method using a potato-starch gel. Data are tabulated and charted. 50 ref.

1098* Computation of Mill Recovery. C. C. Dell. *Bulletin of the Institution of Mining and Metallurgy,* Dec. 1951; *Transactions,* v. 61, pt. 3, 1951, p. 101-104.

Gives recovery formula and chart for determining recovery in beneficiation of ores.

1099* Size Reduction: Comminution Theories, Recent Research, Design Improvements, Special Techniques. R. V. Riley. *International Chemical Engineering & Process Industries,* v. 32, Dec. 1951, p. 577-581.

67 references.

1100 Lean Ores; Methods of Beneficiation in Germany. A. E. Lance. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 565-572.

Discusses and describes treatment of iron ores prior to dispatching them to the steel works.

1101* Difficult Coal Cleaned Efficiently. D. R. Mitchell. *Mechanization,* v. 15, Dec. 1951, p. 73-74, 77-78.

Describes, diagrams, and illustrates wheel-type, dense-medium unit which effectively removes low gravity boney coal from Eagle seam coal.

1102* Iron Ore Mining in the Lake Superior Region in 1951. *Skillings' Mining Review,* v. 40, Dec. 29, 1951, p. 1, 4, 15.

Outlines several new programs for the beneficiation and marketing of taconite in the above region.

1. *Ore and Material Beneficiation*

1103* Beneficiation of the Fines From the Dogger-Ore Resources of Kahlenberg. (In German.) Georg Sengfelder. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 4, Oct. 1951, p. 374-377.

Describes experiments made to concentrate iron less than 10 mm. in particle size by the dry magnetic beneficiation method, in which the ore is ground and separated into CaO-rich and Fe-rich concentrates. Flow charts and diagrams.

Miscellaneous Publications

1104 Demagnetization of Magnetite. Henry E. Hartig, Nordahl I. Onstad, and Norman J. Foot. Mines Experiment Station, University of Minnesota, Information Circular 7, May 1951, 22 pages. (TN21 M66i)

Presents some results of a study of the magnetic properties of the oxides of iron. Second part describes continuous processing of magnetic ores at the Mines Experiment Station. Includes flow diagram and tables.

1105 Studies of Recovery Processes for Western Uranium Bearing Ores. III. The Recovery of Uranium and Vanadium From Acid Leach Liquors of Carnotite Ores. C. F. Coleman. U. S. Atomic Energy Commission, AECD-3238, Nov. 25, 1949, 38 pages. (UF767 Un3m)

A series of studies made using reagents which were known to precipitate U or V. These included, besides hydrolytic precipitation, arsenate, vanadate, and peroxide for uranyl ion; fluoride, oxalate, and p-toluenesulfinate for uranous ion; Fe^{++}, Fe^{+++}, and Pb for vanadate; and phosphate for vanadic ion. Data are tabulated.

1106 Studies of Recovery Processes for Western Uranium-Bearing Ores. V. L. Saine and K. B. Brown. U. S. Atomic Energy Commission, AECD-3241, Oct. 14, 1949, 127 pages. (UF767 Un3m)

Surveys the above. Considers factors influencing the recoveries of U and V by the salt-roast, acid-leach process. Discusses in detail the direct acid-leaching of western ores.

1107 Investigation of the Cougar Spar Fluorspar Deposit, Beaver County, Utah. Floyd D. Everett and Stephen R. Wilson. U. S. Bureau of Mines, Report of Investigations 4820, Nov. 1951, 12 pages. (TN21 Un3r)

Describes the above. Concentration methods included electrostatic separation, air tabling, wet gravity, agglomeration tabling, flotation, and several combinations of these methods. A high-grade metallurgical product was made by combination of jigging, agglomeration tabling, and flotation. Straight flotation tests indicate that acid-grade fluorspar could be made by this method. Data are tabulated.

See Also:
1314 (gas effects on wettability of Pt.)
1831 (recovery of Li from ores)

2. METALS—SMELTING, REDUCTION, AND REFINING

1108* The Effect of High Clay Content in Furnace Slags. (In German.) Hans Schrader. *Archiv für das Eisenhüttenwesen*, v. 22, Sept.-Oct. 1951, p. 275-282.

Presents reasons for increased viscosity of slags with high clay content and methods for alleviating disadvantages arising from this condition. Origin of high clay content is discussed; its influence on desulfurization of ferrous metals is indicated. Data are tabulated and charted.

1109* Contribution to the Metallurgy of Chromium in Basic Steelmaking Processes. (In German.) Erwin Plöckinger. *Archiv für das Eisenhüttenwesen*, v. 22, Sept.-Oct. 1951, p. 283-293.

Reviews, tabulates, and diagrams above on the basis of the literature. Data are compared and systematized. 32 ref.

1110* The Blowing Losses in Smoke From Basic Lined Converters. (In German.) Werner Pepperhoff and Franz Zirm. *Archiv für das Eisenhüttenwesen*, v. 22, Sept.-Oct. 1951, p. 295-297.

Describes an optical method for determining the amount of iron lost in brown converter smoke. Details of the tests, done with an electron microscope, are indicated. Vapor pressure and absorption capacity of iron were investigated. 10 ref.

1111* Electrolytic Preparation of Titanium. G. D. P. Cordner and H. W. Worner. *Australian Journal of Applied Science*, v. 2, Sept. 1951, p. 358-367.

Describes some exploratory experiments in which Ti powder was electrodeposited from a molten mixture of $TiCl_3$ with LiCl and KCl. The cathode deposit was a fine, dendritic form, comparable with that of metal produced by the reduction of $TiCl_4$ with Mg. 10 ref.

1112 Bottom Casting of Ingots for the Manufacture of Plates. T. T. Watson. *Blast Furnace and Steel Plant*, v. 39, Dec. 1951, p. 1471-1475, 1491.

Discusses the above. Hazards in the practice that must be avoided, such as break-outs and defective refractories, are described.

1113 Multiple Burners in Open Hearth Furnaces. H. T. Watts. *Blast Furnace and Steel Plant*, v. 39, Dec. 1951, p. 1484-1491.

Discusses variables which affect the operation of the above. Performance data are given. Diagrams.

1114* The Aluminium Industry. T. G. Pearson. *Chemistry & Industry*, Nov. 17, 1951, p. 988-997.

Surveys development of the above. Methods of production of Al from its ores are outlined. 34 ref.

1115* Oxygen-Carbon Equilibrium in Steel. (In French.) M. Rocquet. *Circulaire d'Informations Techniques*, v. 8, Nov. 1951, p. 1265-1279.

Presents a comparison of various results obtained with respect to the above equilibrium in the open-hearth and an examination of different methods for determining the amount of O_2 in steel. Data are tabulated and charted. 14 ref.

1116 Hydrogen as a Reducing Agent. Carle R. Hayward. *Engineering and Mining Journal*, v. 153, Jan. 1952, p. 85-87.

Discusses various methods of reduction of metals by H_2. Emphasis is on Fe, but brief mention is also made of Ni and Sn.

1117* Refining of Aluminum-Silicon Alloys. (In French.) Louis Grand. *Fonderie*, Oct. 1951, p. 2625-2635.

Discusses Na and low temperature refining of the above, also the refining influences of Na and other elements. Includes tables and micrographs. 15 ref.

1118* Kinetics of the Reduction of Copper-Tin Alloys in a Stream of Hydrogen Chloride. (In German.) Peter and W. D. Treadwell. *Helvetica Chimica Acta*, v. 34, Oct. 15, 1951, p. 1723-1731.

Describes determination of reaction equilibria of Cu and Sn with HCl according to the flow and circulation methods. Characteristic maxima of reaction rates were observed in the range of the intermetallic compounds Cu_6Sn_5, Cu_3Sn, and Cu_2Sn. Data are graphed and tabulated. 18 ref.

1119* Determination of Strength of Graphite Stoppers Used in Bottom Pouring. (In Czech.) O. Kallauner. *Hutnické Listy*, v. 6, Oct. 1951, p. 494-495.

Discusses various methods of testing the above. Using his results, the author proposes a standard test for this type of stopper.

1120* Mineralogical Investigations on Basic Openhearth Slags. (In Polish.) Jerzy Zieba. *Hutnik*, v. 17, Nov.-Dec. 1950, p. 410-415.

Describes and evaluates two methods for the above. Results are tabulated and illustrated for each of the phases present. Photomicrographs.

1121 Electrolytic Refining of Copper From Ammoniacal Cuprous Salt Solutions. Fred A. Schimmel. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2943-2948.

Explores the possibility of refining copper using an ammoniacal electrolyte. Shows that with a given amount of electricity,

twice as much Cu can be refined as with the customary H_2SO_4 process. This process seems particularly adapted to the winning of Cu from Cu-containing solutions.

1122 Oxygen as a Means of Increasing Bessemer Production. II. (Concluded.) W. G. McDonough. *Industrial Heating*, v. 18, Dec. 1951, p. 2211-2212, 2214, 2218.

Describes experiences of National Works, National Tube Co., McKeesport, Pa. Experimental oxygen blows, involving such factors as varying oxygen volume, rate of flow and time of input, are described. Tables and graphs supplement this data.

1123 Ingot and Mould; The Process of Gap Formation. E. T. Linacre. *Iron & Steel*, v. 25, Jan. 1952, p. 3-7, 16.

Presents results of an attempt to establish the nature of the process of gap-formation, so as to provide a basis for calculations of the heat flow from ingot to mold; and also deals with metallurgical consequences of the phenomenon. The existing evidence and some calculations in this report suggest that in a 3-ton ingot, gap-formation starts at the bottom about 3 min. after teeming, but later in a highly alloyed steel ingot. It seems probable that ingot surface quality and the mold life are affected by the way the gap forms, but there has been little attempt to control the process. 39 ref.

1124 Inoculation of Cast Iron; Use of Calcium Silicide. W. S. Williams. *Iron & Steel*, v. 25, Jan. 1952, p. 9-10, 32.

Reviews a previous article on the quasi-Bessemerizing process. Advantages of this process are cited. Methods adopted in its use are described.

1125 Basic O.H. Steel; Calculating the Furnace Charge for Consistent Output. J. R. Cuthbert. *Iron & Steel*, v. 25, Jan. 1952, p. 20-24.

Presents a method for the above which takes into account the varying composition of the ingoing materials and compares actual charge weights and furnace performances with the figures obtained.

1126 Multiple Burners in Open Hearth Furnaces. H. T. Watts. *Iron and Steel Engineer*, v. 28, Dec. 1951, p. 102-107.

Discusses variables affecting the performance of the above. Various burner designs are discussed.

1127 Jet Tapper Practice at the Open Hearth. A. Robert Almeida and Harold Walker. *Iron and Steel Engineer*, v. 28, Dec. 1951, p. 108-109. (A condensation)

Discusses some of the operating results obtained with the above at Republic Steel Corp., Warren, Ohio. Advantages of using this explosive charge are discussed.

1128 Production of Titanium Metal. *Light Metal Age*, v. 9, Dec. 1951, p. 20.

Photographs showing highlights of the process for the above in a pilot plant at Boulder City, Nev.

1129 Secondary Aluminum and Magnesium. W. C. Devereux. *Metal Industry*, v. 79, Dec. 7, 1951, p. 483-485.

Describes the growth of the secondary Al industry from comparative obscurity to its present position. Details are also given of developments now in use and those which appear to have a promising future, and of difficulties as yet unsurmounted.

1130 $CaCN_2$—A Useful Ladle Addition. A. M. White. *Metal Progress*, v. 60, Dec. 1951, p. 79-80.

Discusses the above pointing out that probably the largest application is for tinplate where N_2 causes increased temper hardness with less cold reduction.

1131* Independent Extruder Casts His Own Billet. *Modern Metals*, v. 7, Dec. 1951, p. 38, 40.

Describes a melting, holding, and casting installation for the production of Al extrusion billets.

1132* The Operation of Hot-Blast Stoves With Waste-Gas Circulation. (In German.) Arthur Rein and Oskar J. Stebel. *Stahl und Eisen*, v. 71, Nov. 22, 1951, p. 1310-1313; disc., p. 1313-1314.

Presents design data for the above. Maximum hood temperature was determined. Describes equipment and its operation. Compares operation with and without waste-gas circulation.

1133* Lining of Blast Furnaces With Carbon Bricks. (In German.) Alfred Send. *Stahl und Eisen*, v. 71, Dec. 6, 1951, p. 1361-1365; disc., p. 1365.

Describes development of the above from the carbon-brick-lined hearth to the all-carbon blast furnace. Presents results of investigation of the durability of German and British carbon bricks. Application to the stack is described in detail. Schematic diagrams.

1134 Blast Furnace Practice. I. Operating Theories. II. Thermal Requirements of Shaft. III. Hearth and Bosh Reactions. Charles E. Agnew. *Steel*, v. 129, Dec. 10, 1951, p. 102, 104, 106, 109; Dec. 24, 1951, p. 66-67, 70, 72; Dec. 31, p. 62, 64-65.

Discusses the efficient control of thermal economy. Importance of gas flow through the stack is stressed. Explains why thermal conditions in the bosh exert a major influence on fuel consumption and productivity of the stack. (To be continued)

1135 Forum on Technical Progress: Metals Production. *Steel*, v. 130, Jan. 7, 1952, p. 221-224, 227, 230, 232, 234, 237.

Brief discussions by men from industry on the present situation and anticipations for 1952.

1136* Some Practical Aspects of Recent Developments in Open Hearth Furnace Design and Operation. A. H. Leckie. *West of Scotland Iron and Steel Institute Journal*, v. 57, 1949-50, p. 21-50; disc., p. 51-62.

Summarizes the results of recent research. Principles of design of flues and regenerators are briefly reviewed prior to a more detailed discussion of factors governing port design. Deals with melting-chamber design, and with instruments and furnace operation, with a brief mention of basic roofs and oxygen. 19 ref.

1137* The Relationship Between Carbon Deposition and Reducibility. J. M. McLeod. *West of Scotland Iron and Steel Institute Journal*, v. 57, 1949-50, p. 242-253.

Carbon deposition and reducibility of Fe ores and sinters under conditions similar to those in the blast furnace were investigated. Carbon-deposition ranges for some ores and sinters and variation in amount of deposited carbon with varying CO/CO_2 ratios were determined. It is noted that carbon deposition is at a maximum with easily reduced ores or sinters. Results are graphed and discussed.

1138* Facilitating the Reduction of Metal Compounds by Alloy Formation and Accompanying Calculations. (In German.) N. G. Schmahl. *Zeitschrift für anorganische und allgemeine Chemie*, v. 266, Oct. 1951, p. 1-29.

Presents examples to show that various metal compounds are more readily reduced by alloying them with other metals, thus reducing the pressure of decomposition or altering their equilibrium constants. Graphs and tables. 36 ref.

1139* Electrolysis in Phosphate Melts. IV. Electrolysis of Oxides of Vanadium, Columbium, and Tantalum in Phosphate Melts. (In German.) Hellmuth Hartmann and Werner Mässing. *Zeitschrift für anorganische und allgemeine Chemie*, v. 266, Oct. 1951, p. 98-104.

Describes results of experiments on the above, conducted in order to determine the feasibility of obtaining the pure metals in this way. 12 ref.

1140* Contributions to the Chemistry of Columbium and Tantalum. (In German.) **V. Preparation of Titanium and Tin-Free Columbium and Tantalum.** Harald Schäfer, Lisel Bayer, and Christel Pietruck. **VI. Separating Columbium and Tantalum by Reducing the Columbium Pentachloride.** Harald Schäfer and Christel Pietruck. *Zeitschrift für anorganische und allgemeine Chemie*, v. 266, Oct. 1951, p. 140-160.

Review of literature and description of experiments include tabulated data. 52 ref.

1141* Systematizing the Copper Production Process and Electrothermal Lead Production at the Smelting Plant in Ronnskar, Sweden. (In German.) Olov Herneryd. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 4, Nov. 1951, p. 412-418.

A photograph, diagrams, and tabular data illustrate this description of means applied to increase efficiency of Cu and Pb production.

2. *Metals—Smelting, Reduction, and Refining*

Miscellaneous Publications

1142 Electrodeposition of Zirconium. V. A. Plotnikov and E. B. Gitman. Henry Brutcher, Translation 2668, 13 pages. (From *Zhurnal Prikladnoi Khimii*, v. 19, Aug. 1946, p. 826-832.)

Previously abstracted from original. (Refers to low-cost process for electrolytic production.)

See also:
1094 (Processing Ti Ore in South Africa)
1151 (insulated feeder heads for steel ingots)
1566 (immersion pyrometry in steel making)
2305 (steel making—elementary explanation)

3. FOUNDRY PRACTICE

1143 Effect of Cerium on Ductility and Impact Strength of Steel. C. D. Berry and A. A. Dorvel. *American Foundryman*, v. 20, Dec. 1951, p. 45-46.

Shows how use of cerium as a supplementary addition to steel eliminates the low ductility and low impact strength commonly encountered in dead-killed steel when Al alone is used as a deoxidizer. Ce raises ductility and impact strength by changing the shape, quantity, and distribution of non-metallic inclusions. Data are tabulated.

1144 New Investment Casting Foundry Features Latest Techniques. John T. Andrews, Jr. *American Machinist*, v. 96, Jan. 1952, p. 128-131.

Describes and illustrates Watervliet Arsenal's new investment-casting foundry for production of cannon components and for laboratory experiments in the technique.

1145 How to Seal Porous Castings. M. Jordan Nathason. *American Machinist*, v. 96, Jan. 1952, p. 161, 163.

Gives details of use of thermosetting resins for the above. Schematic diagrams.

1146* How to Successfully Cast a 3-Groove Pulley. (In French.) Guy Henon. *Fonderie*, Oct. 1951, p. 2653-2656.

An article appearing in the Jan. 1950 issue of *American Foundryman* concerned fabrication of the above. The pulley having been tested in 5 foundries with generally unsuccessful results, a presentation of the metallurgical aspects of the problem is made in order to trace the difficulties which have arisen. Includes tables and diagrams.

1147* Feeders for Hand Molding. (In French.) *Fonderie*, Oct. 1951, p. 2657-2658.

Describes a method for avoiding defects of cast iron pieces which often arise upon attachment of feeders because of the difficulties met by the molder in widening the latter sufficiently at their base. Includes diagrams and tables.

1148* Study of the Use of Infrared Radiation for Drying Molds and Firing of Cores. (In French.) *Fonderie*, Oct. 1951, p. 2659-2664.

Evaluates efficiency of the above process. Includes charts and tables.

1149 How to Use the Cupola. (Concluded.) Bernard P. Mulcahy. *Foundry*, v. 79, Dec. 1951, p. 250, 252; v. 80, Jan. 1952, p. 152, 155.

Discusses the influence of C, Si, and other elements on cupola metal. Concluding installment describes tests for mechanical properties of cupola iron, and use of deoxidants, graphitizers, and alloy additions.

1150 Cast-Iron Crankshafts, With Special Reference to Acicular and Spheroidal-Graphite Cast Irons. A. B. Everest. *Foundry Trade Journal*, v. 91, Dec. 6, 1951, p. 643-650.

Discusses cast vs. forged crankshafts and the advantages and disadvantages of cast iron for crankshafts. Also dealt with are the development of cast irons with required mechanical properties; alloy cast irons, including acicular cast iron for crankshafts of Diesel engines; test data and service performance of alloy and special cast-iron crankshafts; spheroidal-graphite cast iron and its possibilities for crankshafts. Micrographs. 12 ref.

1151 Insulated Feeder Heads for Steel Castings and Ingots. H. O. Howson. *Foundry Trade Journal*, v. 91, Dec. 13, 1951, p. 683-686.

Describes how the successful use of feeder sleeves of superior insulating properties for nonferrous castings introduces the prospect of a similar application to steel castings. Trials have shown that insulating methods are applicable to steel-foundry practice, resulting in improved feeding action and allowing the use of hot-tops of reduced volume for steel castings and ingots.

1152 Precision Casting Methods. W. H. Sulzer. *Foundry Trade Journal*, v. 91, Dec. 20, 1951, p. 699-707.

Deals comprehensively with the method of obtaining precision castings, using a fusible pattern, which is known as "investment casting" of the "lost-wax" process, in which an expendable pattern is removed by melting from the mold constructed around it. Detailed information is given on each stage of the process, and recommendations are made of the choice of materials and technique. A table is included giving the tensile properties of precision steel castings.

1153 Better Casting Methods Cut Forming Die Costs. *Iron Age*, v. 168, Dec. 20, 1951, p. 110-112.

Tells how more accurate control of shrinkage and metal solidification in production of sand-cast nonferrous forming dies through new techniques has substantially reduced grinding and labor required to bring dies to final size.

1154 How to Use Copper Alloys in Die Castings. L. F. Spencer. *Iron Age*, v. 169, Jan. 10, 1952, p. 90-91.

Deals with the problems involved in the high casting temperature of Cu alloys. Die-design considerations are discussed. Data on mechanical properties are tabulated.

1155* Production of Aluminum Die Castings for the Hoover Electric Cleaner. *Machinery* (London), v. 79, Nov. 29, 1951, p. 952-957.

Gives details of the above, including the die-making procedure, at Hoover, Ltd. (a British firm.) Illustrations.

1156 Advantages of Designing With Gray Iron Castings. C. O. Burgess. *Materials & Methods*, v. 34, Dec. 1951, p. 63-68.

Describes the casting method on the basis of: improved operational or functional quality which may be conferred on the product by use of castings, economic advantages of the casting process as a manufacturing method, and position of gray iron vs. other cast metals.

1157* The Effect of Cupola Burn-Out on the Melting of Cast Iron With Special Reference to the Water-Cooled Cupola Furnace. (In Dutch.) G. L. Jones and Van Bergen. *Metalen*, v. 6, Nov. 15, 1951, p. 397-404.

After defining the average burn-out cross section (arithmetical average of the burn-out area above each tuyere), results of 3 series of tests carried out with a cupola in which the melting zone is water cooled are given. These tests show that, by water cooling of the melting zone, it is possible to obtain minimum burn-out of the lining and produce longer melts with all the economic and metallurgical advantages of a constant inside cupola diameter.

1158 What Is Fluidity? (Concluded.) T. P. Yao and V. Kondic. *Metal Industry*, v. 79, Nov. 30, 1951, p. 460-462.

Presents some data on the viscosity and spiral fluidity of Al, Sn, Zn, and Al-Ti alloys. Property of surface tension is also considered.

1159 Contamination of Nonferrous Foundry Melts. A. L. Simmons. *Metal Progress*, v. 60, Dec. 1951, p. 74-75.

Discusses accidental contamination and the regular use of contaminated material. Ways of predicting mathematically the future course of such contamination are given.

1160 Stainless Steel Foundry Conserves Critical Alloys. Gilbert C. Close. *Steel*, v. 129, Dec. 24, 1951, p. 58-59.

Tells how 44,000 pounds of castings per month are being produced by an integrated foundry operating on scrap generated in other parts of the plant. (Solar Aircraft Co., San Diego.) Several "impossible" production jobs of casting Type 321 stainless are now routine.

1161* Trimming Production Costs Through Impregnation Methods. M. Jordan Nathason. *Western Machinery and Steel World*, v. 42, Dec. 1951, p. 98-100.

Briefly discusses reasons for porosity in metal castings, sealants in use, preventive vs. salvage impregnation, methods of impregnation, and a bonding technique employing impregnation methods.

1162* Controlled Solidification to Cast Forming Dies Halves Grinding and Polishing Time. *Western Metals*, v. 9, Dec. 1951, p. 35-36.

Describes the above. Method employs bronze flexible tubing which runs through the special high-conductivity facing sand at a distance of approximately ½ in. from the mold-metal interface. Uniform cooling of the working face of the dies is possible. Material is Kirksite.

Miscellaneous Publications

1163 Modification of Aluminum-Silicon Alloys. R. H. Dyke. *Transactions of the American Foundrymen's Society*, v. 59, 1951, p. 28-33; disc., 33-34. (TS200 Am35t)

Presents results of a comparison of various modification techniques for the above. Alloys investigated contained 10-12% Si. Aluminum and silicon themselves were also studied. Effectiveness of several rapid tests to determine whether or not a melt had been successfully modified is described. Micrographs. Data are tabulated. 24 ref.

1164 Chill Tests and the Metallurgy of Gray Iron. D. E. Krause. *Transactions of the American Foundrymen's Society*, v. 59, 1951, p. 79-90, disc., 90-91. (TS200 Am35t)

The design and application of chill tests for the control of the quality of gray iron castings are discussed. Chill tests appear better suited to very soft irons than wedge tests, whereas the latter are better adapted to the harder irons. Influences of composition of the iron, melting practice, and ladle additions on the chilling tendencies of gray iron are discussed. Micrographs, tables and graphs. 12 ref.

1165 The Contribuiton of Riser and Casting End Effects to Soundness of Cast Steel Bars. H. F. Bishop, E. T. Myskowski, and W. S. Pellini. *Transactions of the American Foundrymen's Society*, v. 59, 1951, p. 171-177; disc., p. 177-180. (TS200 Am35t)

Describes the nature of riser casting-edge associations for bar castings of uniform section. Effects of geometry factors on thermal-gradient conditions required are discussed. Data are graphed and tabulated.

1166 Ill Effects and Usefulness of Gases in Metallurgy. E. Spire. *Transactions of the American Foundrymen's Society*, v. 59, 1951, p. 201-208; disc., p. 208-209. (TS200 Am35t)

After discussing briefly the theory of gas absorption in metals, the ill effects of gases like hydrogen and nitrogen are reported for various ferrous and nonferrous metals and alloys. Describes a type of ladle in which gases can be introduced through a porous refractory material. This ladle can be used not only for degassing by inert gas flushing, but also for other metallurgical treatments when mechanical agitation is desired. 27 ref.

1167 Design of Core Boxes and Driers for Use on Core Blowing Machines. E. A. Blake. *Transactions of the American Foundrymen's Society*, v. 59, 1951, p. 216-221; disc., p. 221-222. (TS200 Am35t)

Schematic diagrams of the above are presented.

1168 Determination of Metal Penetration in Sand Molds. Harold J. Gonya and David C. Ekey. *Transactions of the American Foundrymen's Society*, v. 59, 1951, p. 253-260, disc., p. 260. (TS200 Am35t)

Presents a study on such variables as static pressure, distribution, ramming, moisture content, and core setting time as factors significant in brass penetration of sand. Tests on penetration of sand. Tests on penetration by Al alloys were also made. Data are tabulated.

1169 Importance of Slag Control in Basic Cupola Operation. R. A. Flinn and R. W. Kraft. *Transactions of the American Foundrymen's Society*, v. 59, 1951, p. 323-329; disc., p. 329-331. (TS200 Am35t)

Presents an analysis of previous equilibrium data for desulfurization, dephosphorization, and carburization as it affects these reactions in basic cupola operation. Data are graphed and tabulated. 10 ref.

1170 U. S. Navy Non-Ferrous Development Program. Clyde L. Frear. *Transactions of the American Foundrymen's Society*, v. 59, 1951, p. 348-351, disc., p. 351-352. (TS200 Am35t)

Development projects described are: determination of rates of solidification of bronze castings and methods of their control; study of convection currents in molds; study of various methods of melting, molding, and pouring to eliminate defects; and application of radiography to bronze castings.

1171 Effects of Certain Elements on Grain Size of Cast Copper-Base Alloys. R. A. Colton and M. Margolis. *Transactions of the American Foundrymen's Society*, v. 59, 1951, p. 360-368; disc., p. 368-371. (TS200 Am35t)

Presents results of experiments to determine the effect of Ni on the grain size of Cu + 5% Pb, Cu + 5% Sn, Cu + 5% Zn and high purity 85-5-5-5 alloy. Data are tabulated and graphed. Microphotographs.

1172 Increasing Riser Efficiency. James O'Keeffe, Jr., *Transactions of the American Foundrymen's Society*, v. 59, 1951, p. 392-397. (TS200 Am35t)

Reviews briefly fundamental considerations in risering. Points out various methods which are available to increase riser efficiency and to increase product quality. 11 ref.

Books

1173 Directory of Steel Foundries in the United States, Canada, and Mexico. 208 pages. 1951. Steel Founders' Society of America, 920 Midland Bldg., Cleveland 15, Ohio. (Directory shelf)

Contains the latest obtainable information with respect to steel foundries in the U. S., Canada, and Mexico, their personnel, and production facilities. Producers of heat and corrosion-resistant steel castings, high-Mn castings, investment-mold castings, and tool-steel castings are also included.

See also:

1131 (casting of Al billets)
1183 (1951 survey)
1361 (casting Mg-rare-earth alloys)
1362 (microporosity control of Al and Mg castings)
1543 (inspection of castings)
1572 (radiography in foundry practice)
2292 (foundry statistics)
2330 (die casting Hg)

4. METALS—PRIMARY WORKING

1174* Factors Responsible for Thickness Variations During Rolling of Sheet or Strip. (In Polish.) Zygmunt Wusatowski. *Hutnik*, v. 17, Nov.-Dec. 1950, p. 415-423.

Includes roll-pass diagrams and calculations. Discusses factors involved, including temperature, roll-finishing operations, roll pressure, etc. 14 ref.

1175 How to Use Copper Alloys in Forgings and Extrusions. L. F. Spencer. *Iron Age*, v. 168, Dec. 27, 1951, p. 66-69.

A discussion and evaluation of the use of Cu alloys for the above. Data on mechanical properties of various types are tabulated.

1176 Coating Improves Forming Operations. *Iron and Steel Engineer*, v. 28, Dec. 1951, p. 127, 129.

Tells how "Granodraw," a phosphate coating, makes possible the cold extrusion of steel. By phosphate coating steel prior to working it, drawing, extrusion and other forming operations are improved.

1177 Surface Treatment for Cold Extrusion. Adolph Bregman. *Metal Progress*, v. 60, Dec. 1951, p. 76-79.

Describes and illustrates the cold-extrusion process for carbon steel developed in Germany during the last war. Lubricants and phosphate coatings applied to facilitate the process are emphasized.

4. *Metals—Primary Working*

1178* Hot and Cold Forging Methods. C. W. Hinman. *Modern Machine Shop*, v. 24, Jan. 1952, p. 140-142, 144, 146.

Deals with equipment and methods used in the above. Illustrations.

1179* Forging Magnesium. C. J. Orciuch. *Modern Metals*, v. 7, Dec. 1951, p. 54-55.

Discusses the above. Typical forgings from the most widely used Mg alloys are described.

1180 An Examination of Modern Theories of Rolling in the Light of Rolling Mill Practice. III. The Speed Effect in Strip Rolling. Gauge Control. N. H. Polakowski. *Sheet Metal Industries*, v. 28, Nov. 1951, p. 981-986, 992; Dec. 1951, p. 1077-1081.

Includes graphs and diagrams. (To be continued.)

1181 Principles of Continuous Gauge Control in Sheet and Strip Rolling. W. C. F. Hessenberg and R. B. Sims. *Sheet Metal Industries*, v. 28, Dec. 1951, p. 1083-1090.

Describes the mechanism by which longitudinal gauge variations are produced and shows how they may be corrected. In particular, two novel methods of gage control are described.

1182 Extrusion Plus Forging Simplifies Aluminum Forming. G. W. Birdsall. *Steel*, v. 130, Jan. 14, 1952, p. 54-56.

Introduces new concepts in design and production methods for Al parts. Unique combination of extrusion and forging methods reduces metal waste 98.6%, and cuts machining 84%. Diagrams.

1183 Forum on Technical Progress: Processing Methods. *Steel*, v. 130, Jan. 7, 1952, p. 287, 290, 292, 295, 296, 298, 301-302, 304, 307, 308, 310, 313, 316, 321-322, 325, 328, 330, 332, 334, 338, 340, 342, 344, 347, 350, 352, 355-356, 359, 362, 364, 366, 369, 372, 374, 376.

Brief discussions by men from industry on the present situation and anticipation, for 1952. Includes foundry practice, primary and secondary fabrication, and heat treating.

1184 Planning the Air Force Heavy Press Program; Larger Forgings Aid Aircraft Production. K. B. Wolfe. *Steel Processing*, v. 37, Nov. 1951, p. 551-554; Dec. 1951, p. 610-613.

Discusses the need for and the development to date of large horizontal extrusion machines and vertical presses. Comparison with Russia's advancement in this field is made.

1185 An Investigation of Shell Forging Methods. W. Trinks. *Steel Processing*, v. 37, Dec. 1951, p. 603-609.

Explains how, in each step in the hot forging of shells, from billet separation to nosing, many small details must be observed if acceptable forgings are to be made at low cost. Advantages of the cold-forging method are cited.

Miscellaneous Publications

1186 Influence of Austenite Grain Size Upon Drawing Characteristics of Patented Steel Wire. P. Günther. Henry Brutcher, Translation 2748, 7 pages. (From *Archiv für das Eisenhüttenwesen*, v. 22, nos. 5-6, 1951, p. 149-154.)

Previously abstracted from original.

See also:
1197 (forging of hobbing dies)
1305 (swaging tungsten wire)
1355 (cold working with sintered carbide tools)
1392 (rolling and hot working of steel)
1589 (forging and rolling of steels)

5. METALS—SECONDARY WORKING

1187* Superfine Grinding. G. Cattin. *Aircraft Production*, v. 13, Dec. 1951, p. 384-386.

Discusses the factors involved in obtaining mirror finishes and superfinishes on metal surfaces. Describes and illustrates machines used for these operations.

1188* Stretch-Forming. G. W. Weeks. *Aircraft Production*, v. 13, Dec. 1951, p. 393-395.

Presents results of an investigation of the above on Al alloy sheet. The orange-peel effect was overcome by employing a sub-critical annealing treatment. Mechanical properties of the panel after various stages of annealing are tabulated.

1189 Nerve and Sharp Tools Machine *Any* Stainless at High Speeds. E. Von Hambach. *American Machinist*, v. 96, Jan. 1952, p. 117-120.

States that proper grinding and fine surface finish on cutting edges of tools, coolant in the right place and under plenty of pressure, rigid and husky machine tools, and lots of nerve are the requirements for greatly increasing machining speeds.

1190 How Ryan Hot Forms Titanium. *American Machinist*, v. 96, Jan. 1952, p. 125.

In hot-forming procedure outlined, the part is heated to medium red heat and deformed almost to completion. It is then reheated and deformation completed. No springback occurs.

1191 Plastic Tooling Cuts Costs at Lockheed. *Aviation Week*, v. 56, Jan. 7, 1952, p. 42-44, 47-48.

Describes and illustrates use of above for forming, trimming, and drilling of Al-alloy aircraft parts. Advantages are discussed.

1192 Plane Makers Cut Costs, Materials With Plastic Dies. *Business Week*, Jan. 5, 1952, p. 58-60, 62.

Discusses the many advantages of plastic over Zn dies for forming aircraft sheet metals.

1193 The Theory of Plasticity Applied to a Problem of Machining. E. H. Lee and B. W. Shaffer. *Journal of Applied Mechanics*, v. 18, (*Transactions of the American Society of Mechanical Engineers*, v. 73), Dec. 1951, p. 405-413.

Recently developed methods of analyzing stress and strain distributions in the plane plastic flow of an ideally plastic material are applied to the problem of machining. Results of this theory are compared with published experimental results, and with other theoretical analyses. 20 ref.

1194 Radioactive Tracers Speed Tool Life Study. E. J. Tangerman. *American Machinist*, v. 95, Dec. 24, 1951, p. 100-101. (Based on paper by Eugene Merchant and E. J. Krabacher in *Journal of Applied Physics.*)

Describes a method for study of the above, using a cutting tool which has been made radioactive. The radioactivity of the collected particles worn from the tool during a few seconds of cutting is measured. A sintered carbide was used to cut SAE-8650 steel. Data are graphed.

1195* Solving Titanium Machining Problems. *Machinery* (American), v. 58, Dec. 1951, p. 160-166.

Presents a comparison of the mechanical and physical properties of Ti with those of steel and other high-temperature alloys. Various cutting operations are analyzed. Discusses results of various machinability tests.

1196* Cutting Speeds and Feeds for Slotting With End-Mills. Robert Corey Deale. *Machinery* (American), v. 58, Dec. 1951, p. 169-170.

Presents tables giving the cutting speeds and feeds to be used under various conditions on hot-rolled steels and cast iron.

1197 Die Life and Die Typing; German Hobbing Techniques. H. A. Wallace. *Metal Treatment and Drop Forging*, v. 18, Dec. 1951, p. 559-563, disc., p. 563-564.

Describes method of increasing die life and decreasing cost. Covers forging operations, manufacture of the hob, and effect of scale. Schematic diagrams.

1198 Cold-Forming Steel Sections. R. Saxton. *Metallurgia*, v. 44, Dec. 1951, p. 285-286.

Some of the factors concerned in the production of steel sections of small cross-sectional area are considered, and brief reference is made to the hot-drawing process.

1199* The Machinability of Alloy Steels in Connection With Fine-Finish Turning. (In German.) Gustav Wagner and Paul Wiest. *Stahl und Eisen*, v. 71, Nov. 22, 1951, p. 1317-1323.

Describes rapid methods for machinability testing. Results of examination of 23 alloy steels by these methods are described. Relative merits of the different methods are indicated. Data are charted and tabulated.

1200 Disintegration Becomes Production Necessity. Gene Burch. *Steel*, v. 130, Jan. 14, 1952, p. 60-62.

Shows that the ability of disintegration equipment to drill or cut hardened metal has resulted in the salvaging of millions of dollars worth of parts that would have been junked if they could not be repaired or salvaged. Developments in the field and various applications are discussed.

Miscellaneous Publications

1201 Fundamental Aspects of Metal Cutting and Cutting Fluid Action. Hans Ernst. *Annals of the New York Academy of Science*, v. 53, art. 4, June 27, 1951, p. 936-961. (Q11 N49a)

Discusses the above, giving results of experimental investigations and mathematical analyses. Diagrams and illustrations. 36 ref.

1202 The Metal Cutting Process as a Means of Studying the Properties of Extreme Pressure Lubricants. Milton C. Shaw. *Annals of the New York Academy of Science*, v. 53, art. 4, June 27, 1951, p. 962-978. (Q11 N49a)

Discusses the inter-relationship between the shearing and sliding phases of cutting, and covers in detail the sliding and frictional aspects of the process.

Books

1203 Rezhimy Rezaniia Metallov Instrumentami iz Bystrorezhushchei Stali (dlia Odnoinstrumentnoi Obrabotki) [Conditions for Cutting Metals With High-Speed Tool-steels (for Single-Point Machining.)] 339 pages. 1950. Government Scientific-Technical Publishing House for Machine-Construction Literature, Moscow, U.S.S.R. (TJ1230 M66r)

Standardizes conditions for machining ferrous and non-ferrous metals and light alloys on lathes, planning machines, grooving machines, milling machines, drilling machines, screw-cutting lathes, gear-cutting machines, and broaching machines. Extensive tabular data and schematic diagrams. 66 ref.

See also:
1176 (phosphate coatings before working of steel)
1183 (1951 survey)
1228 (forming Al floor beams)
1251 (hot peening of tool steels)
1346 (peening of steel welds)
1356 (performance of silicon carbides in tools)
1790 (bending rolls)

6. POWDER METALLURGY

1204 Utilizing Impurities in Metal Powders. H. W. Greenwood. *Metal Industry*, v. 79, Nov. 30, 1951, p. 455-456.

Emphasizes importance of minor percentages of elements on properties of the base metal. Further areas of research in this field are suggested.

1205 Some Observations on the Role of the Binder in Cemented Refractory Alloys. J. T. Norton. *Powder Metallurgy Bulletin*, v. 6, Dec. 1951, p. 75-78.

Discusses the advantages and disadvantages of a solid homogeneous block of tungsten carbide as compared to tungsten carbide cemented with Co. Favors the heterogeneous combination, and lists criteria for a satisfactory binder material.

1206 Steel Parts by Hot Coining. J. P. Scanlan. *Powder Metallurgy Bulletin*, v. 6, Dec. 1951, p. 78-80.

Discusses the above as a method of increasing the density of parts made from powdered steel alloys. Table gives mechanical properties and density of 3 hot-coined alloy steels.

1207* Infiltration Metallurgy. Claus G. Goetzel. *Research*, v. 4, Dec. 1951, p. 555-561.

Surveys principles of the above. Variations in techniques of production are discussed. Mechanical and physical properties of some powder combinations as well as applications are given. Data are graphed.

See also:
1111 (preparation of Ti powder)

7. METALS—WELDING OR JOINING

1208* Design for Redux. H. Giddings. *Aircraft Production*, v. 13, Dec. 1951, p. 387-392.

Briefly reviews the basic characteristics of the Redux joint. The application of Redux to the basic types of structural element in aircraft, to the stiffening panel of various forms subject to compression, shear and bending types of loading is discussed. Redux specimens consisted of D.T.D. 610 type Al alloy. Diagrams and graphs.

1209 Welding Band-Saw Blades. H. J. Chamberland. *American Foundryman*, v. 20, Dec. 1951, p. 53-54.

Tells how to select and use welding equipment designed to produce band-saw welds that hold up under high or super-high speeds. Illustrations.

1210 How to Tip Tools With Prehardened HSS. Leo J. St. Clair. *American Machinist*, v. 96, Jan. 1952, p. 133-140.

Tells how to braze prehardened high-speed-steel tips to ordinary steel tool shanks, for conservation of critical Co and W. The author grants free permission for use of patents held by him on the process. Numerous schematic diagrams.

1211 Aluminum Cylinder Head Formed by New Methods. Frank Jardine. *Automotive Industries*, v. 195, Dec. 15, 1951, p. 34-35, 112.

Tells how furnace brazing of individual permanent-molded sections permits economical production of light-alloy cylinder blocks and heads.

1212* Welding of Aluminum Alloys by the MATI Method. G. D. Nikiforov. *Avtogennoe Delo*, v. 22, Mar. 1951, p. 1-4.

Equipment and techniques for the above are described and illustrated. Recommendations are made for oxy-acetylene welding of various thicknesses of 4 alloys.

1213* Power Sources for Argon-Arc Welding of Aluminum Alloys With Tungsten Electrodes. L. A. Mordvintsev and E. A. Guseva. *Avtogennoe Delo*, v. 22, Mar. 1951, p. 4-7.

Oscillographic studies were made of the welding currents from different power sources and various auxiliary equipment. The influence of these variables on the welds were also investigated. Results are discussed and illustrated.

1214* The Question of Intercrystalline Corrosion of 18-8 Type Steel During Single-Pass Butt Welding. A. G. Mazel. *Avtogennoe Delo*, v. 22, Mar. 1951, p. 7-9.

The influence of temperature and duration of heating for various types of welding on corrosion of 18-8 was investigated. Data are discussed and tabulated.

1215* Test of Metals for Sensitivity to Thermal Cycles of Welding. E. M. Kuzmak. *Avtogennoe Delo*, v. 22, Mar. 1951, p. 9-11.

Discusses the influence of different types of heating and various thermal cycles encountered in arc welding on structural changes of certain steels. Results are discussed and charted.

1216* Preparation of Ferromanganese for Electrode Coatings. N. N. Kriukovskii. *Avtogennoe Delo*, v. 22, Mar. 1951, p. 15-17.

The influence of the fineness of ferromanganese powder on the composition of the deposited metal in welding steel was investigated. Data are discussed and tabulated.

1217* Single-Pass, Submerged-Melt Welding of Boiler Steel 10-20 Mm. Thick. S. E. Sinadskii. *Avtogennoe Delo*, v. 22, Mar. 1951, p. 17-21.

Equipment and techniques of applying flux materials during submerged-melt welding is described. The influence of various fluxes and welding conditions was investigated. Results are discussed and charted.

1218* Ways of Reducing Porosity of Weld Seams During Automatic Welding of Structural Sections. A. S. Fal'kevich and V. S. Volodin. *Avtogennoe Delo*, v. 22, Mar. 1951, p. 21-23.

X-ray investigations were conducted on steel welds made with fluxes containing different amounts of moisture. Results are discussed and summarized.

7. *Metals—Welding or Joining*

1219* Rational Methods of Welding Concrete-Reinforcements for Hydroelectric Structures. N. L. Kaganov. *Avtogennoe Delo,* v. 22, Apr. 1951, p. 1-4.

Techniques and apparatus for arc and gas welding of concrete reinforcing rods are described and tabulated.

1220* Mechanization and Automatization of the Processes of Welding Fittings and Networks for Reinforced Concrete. N. E. Nosenko and V. A. Gorokhov. *Avtogennoe Delo,* v. 22, Apr. 1951, p. 4-7.

Machines for electric welding of reinforcing materials are described and illustrated.

1221* Investigation of the Equilibrium State of the Metal-Slag System During Wedding With TsI-1 Electrodes. V. A. Lapidus. *Avtogennoe Delo,* v. 22, Apr. 1951, p. 12-15.

Equilibrium conditions in the molten deposit during arc welding of steels with above rods are calculated. Results are discussed and tabulated.

1222* Equipment of TsNIITMAsh [Central Scientific-Research Institute of the Heavy Machine Industry] for Automatic Welding With Three-Phase Current. I. L. Brinberg. *Avtogennoe Delo,* v. 22, Apr. 1951, p. 15-20.

Above equipment is described, diagrammed, and illustrated. Includes circuit diagrams.

1223 Studies of Ceramic Fluxes for Welding Steel. II. Willi M. Conn. *Ceramic Age,* v. 58, Nov. 1951, p. 15-17.

Electric arc welding by means of the "submerged-arc process" is discussed briefly. Lists 11 principal requirements which must be met by a flux. The performance of fluxes prepared by different methods is discussed including those consisting of a mechanical mixture of several ingredients, flux based on glass, and that based on mullite.

1224 New Frequency Converter Welders Developed for Aircraft Alloys. F. L. Brandt. *Iron Age,* v. 168, Dec. 27, 1951, p. 72-73.

Describes and discusses the above. Tabulated data.

1225 High Hardenability Steels Flash-Welded Automatically. Jon Ruhlman and B. E. Nye. *Iron age,* v. 168, Dec. 20, 1951, p. 95-99.

Describes the flash-butt welding process in use in the fabrication of aircraft landing gears from high-strength alloy steels. Illustrations.

1226 The Weldability and Mechanical Properties of a Series of Low-Alloy Steels. J. G. Ball and C. L. M. Cottrell. *Journal of the Iron and Steel Institute,* v. 169, Dec. 1951, p. 321-336.

Diagrams indicating the effect of steel composition on weldability were constructed, and compared with others indicating the mechanical strength of the steels in both the normalized and tempered conditions; these comparisons leading to a range of compositions giving the best combination of weldability and mechanical strength. The microstructure of the steels in the normalized condition is related to their weldability, and the effect of tempering temperature after normalizing on the mechanical properties and microstructure of one of the steels was investigated; evidence to support a significant relationship observed has been obtained from a number of the other steels of the series. Table summarizes results. 10 ref.

1227* The Metallurgical Principles of Stage Welding. Tore Noren. *Machinery Lloyd* (Overseas Ed.), v. 23, Dec. 8, 1951, p. 106-107, 109, 111-114.

Describes new welding method applicable to tool steels. It is useful in the repair of high-speed-steel tools and tools of similar alloys.

1228* Spotwelding Structural Aluminum Floor Beams. Gilbert C. Close. *Modern Machine Shop,* v. 24, Jan. 1952, p. 128-130, 132, 134, 136.

Tells how the above results in a saving in weight. Forming, heat treating, and finishing operations are also described.

1229 Research Progress by the British Welding Research Association. H. E. and H. G. Taylor. *Sheet Metal Industries,* v. 28, Dec. 1951, p. 1121-1130, 1136.

Reviews research under way in the laboratories of the Sheet and Strip Metal Users' Technical Assn. Formulation of codes of practice for resistance-welding processes is an important object of the work. Illustrations, graphs, and diagrams are given. 15 ref.

1230 A Review of the Theory and Practice of Inert-Gas Shielded-Arc Welding. W. J. Jackson. *Sheet Metal Industries,* v. 28, Dec. 1951, p. 1131-1136.

Surveys the above. 14 ref.

1231 Stainless Brazed Without Fluxing. F. W. Beall. *Steel,* v. 130, Jan. 14, 1952, p. 57.

Describes how difficulties of furnace brazing stainless steel parts are largely overcome by first plating the parts with a thin coating of iron.

1232 Forum on Technical Progress: Fastening & Assembling. *Steel.* v. 130, Jan. 7, 1952, p. 379-380, 382, 384-386, 389-390, 393, 396, 398.

Brief discussions by men from industry on the present situation and anticipations for 1952.

1233 A Comparison of Heating Methods for Brazing. Part I. Lester F. Spencer. *Steel Processing,* v. 37, Dec. 1951, p. 617-623.

Outlines advantages of brazed joints which makes brazing an ideal method for the joining of metals. Factors to be considered in the brazing methods are discussed. (To be continued.)

1234* Submerged-Arc Welding in Tandem. E. A. Clapp. *Welding Engineer,* v. 37, Jan. 1952, p. 43-47.

Describes a new method which uses 3-phase power in submerged-arc welding. Welding speeds are 2-3 times faster than can be obtained with a single-rod technique. The effect of phase angle, phase sequence, power distribution between rods, and of primary power factor were investigated. Most of these factors were found to have considerable influence on the quality of the welds produced.

1235* Corrosion-Free Stainless Welds. G. E. Linnert. *Welding Engineer,* v. 37, Jan. 1952, p. 51-53.

Discusses mechanical properties of the extra-low-carbon stainless steels. Stresses resistance to intergranular corrosion. Eliminates postweld annealing, simplifies field repair, reduces metal costs, and conserves Cb.

1236* Spot and Projection Welding Using Magnetic Electrode Force. Wm. E. Klingeman and Harold H. Kruer. *Welding Journal,* v. 30, Dec. 1951, p. 1073-1078.

Describes a new tool for joining ferrous and nonferrous metals. This new welding process has made it possible to weld previously difficult and critical applications with a new degree of uniformity. It is mainly being used for the welding of pure silver, coined silver and tungsten electrical contacts, although advantages have also been found for many other applications involving brass, copper, and stainless steel. Diagrams and illustrations.

1237* The Effect of Power-Supply Characteristics on D.C. Welding. Jack B. Keyte. *Welding Journal,* v. 30, Dec. 1951, p. 1079-1083.

A study of the influence of variations in the slope of the volt-ampere characteristic curve and the machine time constant of a d.c. welding machine on spatter loss, deposition rate, and penetration. Data are diagrammed and graphed.

1238* Sigma Welding of Carbon Steels. H. T. Herbst and T. McElrath, Jr. *Welding Journal,* v. 30, Dec. 1951, p. 1084-1091.

Detailed description of experimentation resulting in the successful welding of carbon steels by the shielded-inert-gas metal arc process; achieved by the addition of small amounts of O_2 to the argon gas. Data are tabulated and graphed.

1239* Dilution and Diffusion Aspects of Nonfusion Welding. R. D. Wasserman and J. Quaas. *Welding Journal,* v. 30, Dec. 1951, p. 1098-1101.

The science of physicochemical phenomena and thermodynamic

data is applied to a better understanding of the brazing processes. Data are diagrammed and tabulated for a wide variety of ferrous and nonferrous alloys.

1240* The Welding and Brazing of Copper Alloys. J. Imperati and Ira T. Hook. *Welding Journal*, v. 30, Dec. 1951, p. 1102-1107.

Presents a survey of the more important Cu and Cu alloys, and the welding processes and techniques commonly used. Data are tabulated.

1241* Temperature Distribution During the Flash Welding of Steel. E. F. Nippes, W. F. Savage, J. J. McCarthy, and S. S. Smith. *Welding Journal*, v. 30, Dec. 1951, p. 585s-601s.

Above methods are compared on the basis of temperature distribution. Tells how this information may be utilized in selecting flashing variables. Data are graphed and tabulated for welding of SAE-1020 steel.

1242* Improvement of Inert-Gas Welding by Using High-Purity Helium. William A. Mays. *Welding Journal*, v. 30, Dec. 1951, p. 602s-606s.

Discusses He-shielded arc-welding process which produces sound, nonporous welds on Al, Mg, stainless steel, and many other hard-to-weld metals. Describes and discusses the effects of various impurities on the welding of Al, also precautions necessary in handling high-purity He to avoid contamination.

1243* Relation of Notch Strain to Deflection in the Notch-Bend Test. E. M. Emery and A. E. Flanigan. *Welding Journal*, v. 30, Dec. 1951, p. 607s-612s.

Presents results of an experimental investigation of the strains developed at the base of the notch in a longitudinal notch-bend specimen used for the evaluation of weld ductility. Material was ASTM A285-C steel plate. Illustrated.

1244* Microcracks and the Low-Temperature Cooling Rate Embrittlement of Welds. A. E. Flanigan and M. Kaufman. *Welding Journal*, v. 30, Dec. 1951, p. 613s-622s.

Presents the results of tensile, fatigue, and impact tests on mild-steel welds together with a discussion of certain features of the microcracks which are associated with embrittlement produced by too rapid cooling following welding. Diagrams and microphotographs.

1245* A New Proposal for Steel Filler Wire for Welding. H. Sekiguchi. *Welding Journal*, v. 30, Dec. 1951, p. 622s-624s.

Presents results of tests using steel wire containing adequate quantities of deoxidizers such as Mn and Si for filler wires for welding of mild steel. Data are graphed and tabulated.

1246* Welding and Soldering Aluminum. (In French and German.) E. Zurbrügg. *Zeitschrift für Schweisstechnik; Journal de la Soudure*, v. 41, Sept. 1951, p. 161-165; Oct. 1951, p. 183-191.

Discusses the various methods and conditions for welding Al and its alloys. Graphs show strength data of welded and annealed Al alloys and diagrams illustrate different weld designs. Concluding part emphasizes particularly the advantages of welding under inert gas without flux and characterizes brazing and soldering of Al.

1247* Welding of "Aluman" Roofing. (In French and German.) E. Müller. *Zeitschrift für Schweisstechnik; Journal de la Soudure*, v. 41, Dec. 1951, p. 217-222.

Describes and diagrams in detail the welding of various "Aluman" (Al-Mn alloy) roofing and gutter types. Photographs illustrate article.

Miscellaneous Publications

1248 Is Columbium Necessary in the Filler Wire (For Welding 18-8 Stainless)? I. Z. Kagan. Henry Brutcher, Translation 2731, 5 pages. (From *Avtogenoe Delo*, v. 22, Apr. 1951, p. 26-27.)

A report on practical experiences in manual and automatic arc welding of stainless steels with Cb-containing vs. Cb-free electrodes.

See also:
1389 (welding in steel-pipe fabrication)
1390 (welding techniques on Cr-Ni stainless steels)
1392 (welding steel plates)
2255 (voltage interference between resistance welders.)
2256 (welding calculations)
2257 (a.c. arc welders)
2258 (welding arcs)
2267 (H_2 brazing electron-tube parts)

8. METALS—THERMAL TREATMENT

1249 How Flame and Induction Heating Work. John Obrebski. *American Machinist*, v. 96, Jan. 1952, p. 122-125.

Description is clarified by schematic diagrams showing application to various steel parts.

1250 High Production Heat Treatment of Steering Gear Parts. Geo. Goepfert. *Automotive Industries*, v. 106, Jan. 1, 1952, p. 50-52, 90, 92, 94.

Describes heat-treatment procedures applied to steering cams made of SAE-8620 steel. Illustrations.

1251 Step Quenching, Hot Peening Improve Lean Alloys. R. F. Harvey. *Iron Age*, v. 168, Dec. 27, 1951, p. 70-71.

Discusses a modified step-quench treatment for toolsteels wherein higher intensities of peening may be used safely without danger of cracking.

1252 Martempering; Invention and Early History. Richard F. Harvey. *Iron & Steel*, v. 25, Jan. 1952, p. 14-16.

Surveys literature on the above. References.

1253 Flame Hardening and Tempering of Steel. *Metal Progress*, v. 60, Dec. 1951, p. 120, 122, 124. (Translated and condensed from paper by Hans Bühler and Hans Wilhelm Grönegress, *Stahl und Eisen*, v. 71, Mar. 29, 1951, p. 343-347.)

Describes a method of complete heat treatment of unalloyed and alloyed steels without the use of furnaces. Strength properties established were found to be equivalent to those produced by conventional furnace heat treatments.

1254 The Surface Hardening of Steel. Part XI. Flame Hardening. G. T. Colegate. *Metal Treatment and Drop Forging*, v. 18, Dec. 1951, p. 549-558.

Discusses the potentialities of flame-hardening and its accompanying problems, including the design of gas jets, and design and position of the quenching jets. Various flame-hardening techniques and influence of composition of the steel are described. Advantages and disadvantages of flame-hardening are enumerated. (To be continued.)

1255* Hardenability Testing of Structural Alloy Steels. (In German.) Max Kroneis and Helmut Krainer. *Stahl und Eisen*, v. 71, Dec. 6, 1951, p. 1365-1374; disc., p. 1375.

Describes application of two methods for the above to steels containing 0.25-0.40% C, 0.3-1.25% Si, 0.6-1.8% Mn, 0-0.8% Al, 0-2.4% Cr, 0-0.2% Mo, and 0-0.2% V. Discusses advantages and disadvantages of the two methods. Includes graphs and tables.

1256 Flame Softening in Metal Fabricating Industries. William B. Sharav. *Steel Processing*, v. 37, Dec. 1951, p. 599-602, 613.

Describes 3 flame-softening methods. Includes a discussion on costs, process results, and miscellaneous applications.

See also:
1183 (1951 survey)
1188 (sub critical annealing treatment of Al mechanical properties of stretch-formed Al)
1228 (heat treating Al floor beams)
1305 (annealing and heat treating tungsten)
1359 (ductile iron—heat treatment effects)
1372 (heat treatment of nimonic alloys)
1389 (heat treatment in steel pipe-fabrication)
1390 (heat treating Cr-Ni stainless steels)
1392 (heat treatment of steel plates)
1587 (hardenability of boron steels)
2267 (heat treating electron tube parts)

9. CLEANING, FINISHING, AND COATINGS—METALLIC

1257 Cleaning of Steel Test Panels for Paint. Thomas Rice. *ASTM Bulletin*, Dec. 1951, p. 50-58.

Two basic cleaning methods for removal of oil and smut were

9. *Cleaning, Finishing, and Coatings—Metallic*

adopted, that is, solvent spray cleaning and trichlorethylene vapor degreasing; and also 2 modifications of these in which a phosphoric acid dip is used. A standard method for packaging panels has been adopted following an investigation of several methods. Methods for testing cleaned panels for cleanliness and surface activity were investigated and recommendations given. Tables and test-panel photographs.

1258 After-Deposits Resulting From Chemical Cleaning Process. P. H. Cardwell. *Combustion*, v. 23, Dec. 1951, p. 67-68.

Presents a study on the amount and type of the above. Causes for corrosion on the internal metal surface of the boiler are discussed.

1259* Alternatives of Nickel-Chromium Plating; Some British Views. *Electroplating and Metal Finishing*, v. 4, Dec. 1951, p. 379-380.

Surveys of some of the salient points which emerged from the Practical Platers' One-Day Conference on the above subject, held by the Institute of Metal Finishing in Birmingham on Nov. 6, 1951.

1260* Application of Dilatometric Analysis to the Enameling of Cast Iron. (In French.) Auguste Le Thomas and Pierre Tyvaert. *Fonderie*, Nov. 1951, p. 2685-2691.

Presents results of a comparative study of the expansibility of cast iron and enamel, explaining dilatometric measurements and some examples of their application. Includes tables and diagrams.

1261 Sherardizing; Modern Developments and Applications. A. E. Williams. *Iron and Steel*, v. 25, Dec. 1951, p. 529-533.

Discusses the above. The nature of the coating obtained is discussed and also the essential ingredients of a mixture. Typical applications are given.

1262* Producing Low-Cost Molds for Aircraft Parts by Metallizing. G. B. Lewis and L. Frost. *Machinery* (American), v. 58, Dec. 1951, p. 152-156.

Describes procedures employed in the above. Hydrocal, phenolic, ceramic, aluminum, and Kirksite molds were metallized and were shown to give satisfactory results in forming low-pressure laminated plastics.

1263 Electrodeposited Tin Alloy Coatings Are Promising Alternates for Tin Plate. Kenneth Rose. *Materials & Methods*, v. 34, Dec. 1951, p. 70-72.

Discusses process and applications for Sn-Cu, Sn-Zn, and Sn-Ni plating.

1264 Volatile Crystals Prevent Corrosion of Packaged Steel Parts. Philip O'Keefe, Jr. *Materials & Methods*, v. 34, Dec. 1951, p. 84-86.

Presents a new method of preventing the corrosion of packaged steel articles by moisture. The vapor from the crystals condenses on the metal surfaces or dissolves in condensing moisture. The steel must be enclosed, although hermetic sealing is not necessary. Can be applied as a powder, dissolved in alcohol and sprayed into solution for metal dips, or used as a coating on wrapping papers. Discusses properties, test results, and industrial applications.

1265 Alternatives to Nickel-Chromium Plating. Answers to Queries in "Bright Zinc" Discussion. *Metal Industry*, v. 79, Dec. 14, 1951, p. 503-504.

Presents a discussion on a paper "Bright Zinc Plating" by N. A. Tope.

1266 Nickel Plated Slides. H. H. Symonds. *Metal Industry*, v. 79, Dec. 14, 1951, p. 504-505.

Briefly describes an investigation on a defective finish encountered on a number of Ni-plated, case-hardened slides. Micrographs.

1267* Latest Developments in Cyanide Zinc Baths. (In German.) Heinz W. Dettner. *Metalloberfläche*, ser. B, v. 3, Oct. 1951, p. B145-B148.

Reviews the above on the basis of the literature, with particular regard to new American processes. 36 ref.

1268 Notes on the Metallising of Plastics. D. McPherson. *Metallurgia*, v. 44, Dec. 1951, p. 290, 310.

Presents an outline of processes in use for metallizing plastics and includes developments in progress toward alloying plastic and metal without noticeable interfacial weakness.

1269 Chemical Brightening of Aluminum and Light Alloys. J. Hérenguel. *Metal Treatment and Drop Forging*, v. 18, Dec. 1951, p. 539-542.

Describes French work on chemical brightening, which adds to techniques for the metallographic study of aluminum alloys, and also has industrial applications. It is complementary to, rather than competitive with, electropolishing.

1270 The Electrodeposition of Molybdenum and Its Alloys. F. W. Salt. *Murex Limited Review*, v. 1, no. 9, 1951, p. 201-210.

Discusses the history of Mo deposition; recent work is described in some detail.

1271 Chromic Acid Anodizing Equipment and Its Practical Use. Herberth E. Head. *Plating*, v. 39, Jan. 1952, p. 40-41, 50.

Discusses factors to be considered in the above which promote greater efficiency as well as provide safe working conditions for the workers.

1272 Electroplating of Gold Alloys. (Concluded.) Edward A. Parker. *Plating*, v. 39, Jan. 1952, p. 43-46, 50.

Includes data on green gold, white gold, antique gold, rose and green-gold smut. After-treatment is briefly discussed. 42 ref.

1273 Making Finishing Compositions. L. R. Eastman. *Plating*, v. 39, Jan. 1952, p. 47-49.

Describes and illustrates the various steps in the above. Refers to abrasives used for polishing and buffing.

1274 Cleaning and Preparation of Metals for Electroplating. IV. Degreasing Evaluation Tests: Sequential Testing. Henry B. Linford and Edw. B. Saubestre. *Plating*, v. 39, Jan. 1952, p. 55-63.

Discusses statistical analysis of results on the above. Data are tabulated.

1275* Review of Current Literature: Diaphragm Tanks. T. A. Hood. *Plating Notes*, v. 3, Oct. 1951, p. 178-183.

Includes diagrams.

1276* Finishing Precision Aircraft Accessories. Gilbert C. Close. *Products Finishing*, v. 16, Dec. 1951, p. 14-18, 20.

Using a small air-expansion turbine as an example, a description of the finishing operations at AiResearch Mfg. Co., Los Angeles is given. Cleaning, surface treating, and painting operations on this small Al article are described.

1277* Quick Clear Dip Cuts Cost of Finishing Zinc Die Castings and Plated Parts. Arthur P. Schulze. *Products Finishing*, v. 16, Dec. 1951, p. 24-28, 30, 32.

Describes a process called "Unichrome Clear Dip" in use at Congress Drives Div., Tann Corp., Detroit. Outstanding advantages are its greater corrosion resistance and improved adhesion of organic coating on Zn.

1278* Recent Developments in Ceramic Coatings for Steel. Allen G. Gray. *Products Finishing*, v. 16, Dec. 1951, p. 44, 46, 48, 50, 54, 56, 58, 60, 62, 66, 68, 70, 74.

Discusses the above, as reported by various investigators. Some theories for adherence of porcelain enamels to steel are mentioned. Results of adherence and abrasion tests are given. Data are tabulated.

1279 Forum on Technical Progress: Cleaning & Finishing. *Steel*, v. 130, p. 401-402, 404, 407-408, 410, 412, 415, 418, 420, 423-424.

Brief discussions by men from industry on the present situation and anticipations for 1952.

1280* Electrolytic-Slide-Polishing. (In English.) Kenzo Nagai and Kunio Mano. *Science Reports of the Research Institutes, Tohoku University*, ser. B, v. 1-2, Mar. 1951, p. 391-398.

Electropolishing is recognized as a very convenient method for polishing metals. Sometimes, so-called "electrolytic-slide polish-

ing," proves to be a better and more convenient method. Describes polishing of various metals by the latter method. In the process acid electrolyte is used on some metals (Cu, Al, Zn, Ni, Fe, Mo, and their alloys), cyanide on precious metals (Ag, Au, Pt), and basic electrolytes on Al, Zn, and W. Explains the mechanism of metal polishing by this method and compares experimental results of metal polishing by this method with those of conventional electropolishing.

Miscellaneous Publications

1281 Hardness of Sprayed-Metal Coated Surfaces and Effect of Hardness on Wear Resistance. V. A. Shadrichev. Henry Brutcher, Translation 2589, 6 pages. (From *Vestnik Mashinostroeniya*, v. 28, no. 11, 1948, p. 21-23.)

A study of the most favorable conditions for producing sprayed-metal coatings of high hardness and wear resistance, and the relationship between hardness and wear resistance of such coatings. Material studied was 0.45% C steel wire sprayed on SAE-1045 steel.

1282 Investigation of Some Pickling Inhibitors. S. A. Balezin and S. K. Novikov. Henry Brutcher, Translation 2747, 10 pages. (From *Zhurnal Prikladnoi Khimii*, v. 24, no. 3, 1951, p. 283-288.)

Previously abstracted from original.

1283 Ceramic Coatings for Prevention of Carbon Adsorption in Four Heat-Resistant Alloys. Joseph W. Pitts and Dwight G. Moore. National Advisory Committee for Aeronautics, Technical Note 2572, Dec. 1951, 14 pages. (TL570 Un3t)

Three ceramic coatings were applied to Inconel and 3 18-8 type stainless steels and then tested for their effectiveness in preventing carbon adsorption under strongly carburizing conditions, that is, box carburizing. At 1350°F. no carbon pickup occurred after the 4-hr. treatment but, at 1500° and 1650°F., carbide precipitation was evident in the uncoated stabilized 18-8 steels extending down from the surface to a depth as great as 0.007 in. In most cases the ceramic coatings completely prevented the adsorption. Tables, graphs, and photomicrographs. 11 ref.

See also:
1231 (plating stainless with Fe before furnace brazing)
1298 (surface impregnation of steel with Ce)
1334 (diffraction study of thick metal layers)
1373 (Cr coating on stainless and carbon steels)
1375 (abrasion and polishing)
1764 (structure of polished metal surfaces)
2267 (cleaning and electroplating of electron tube parts)
2274 (photographs on aluminum)

10. METALLOGRAPHY AND PRIMARY STRUCTURES

1284* The Experimental Determination of the Valence Electrons in Crystal [illegible]he Distribu[illegible]n English.) *Acta Crystallagraphica*, v. 4, Nov. 1951, p. [illegible]1-482.

Discusses work of Ageev and coworkers on above for Al, Ni, and NiAl. Possible inaccuracies are considered. 13 ref.

1285* Diffuse Scattering by an Ordering Alloy. (In English.) J. B. Newkirk, K. Smoluchowski, A. H. Geisler, and D. L. Martin. *Acta Crystallographica*, v. 4, Nov. 1951, p. 507-512.

At an early stage of the ordering reaction process in CoPt crystals, thin platelets of the ordered phase form on (110) planes of the disordered matrix phase. These platelets are coherent with the matrix. Since (110) planes of the two phases are not identical, when each is in an unstrained condition, they mutually strain each other, causing characteristic diffuse X-ray diffraction effects and the marked changes in physical properties previously reported.

1286* Certain Crystallo-Chemical Anomalies in the Systems Mg-Zn and Mg-AlCu. (In Russian.) M. S. Mirgalovskaia. *Doklady Akademii Nauk SSSR*, new ser., v. 78, June 11, 1951, p. 909-911.

It was found that crystallographic anomalies exist in the Mg-AlCu system similar to those in the Mg-Zr system, in particular for MgZn, $MgZn_2$, and $MgZn_5$. Data are charted and discussed.

1287* Basic Pattern of Phase Equilibrium in Highly Coercive Fe-Ni-Al Alloys. O. S. Ivanov. *Doklady Akademii Nauk SSSR*, new ser., v. 78, June 21, 1951, p. 1157-1160.

Equilibrium diagrams for Fe-Ni-Al and for the 50 at. % sections of the system were determined by physical properties, microstructures, thermal-expansion, and electrical-conductivity tests.

1288* Submicroscopic Structure of "Alni" Alloy. (In Russian.) N. N. Buinov and R. M. Lerinman. *Doklady Akademii Nauk SSSR*, new ser, v. 79, July 1, 1951, p. 69-72.

Electron-microscope study shows structural differences of an alloy containing 25% Ni, 14% Al, 0.15% Cu, balance Fe, for different heat treatments. Corresponding coercive-force values are given. Photomicrographs illustrate results.

1289* Structures of Iron-Nickel-Aluminum Alloys for Permanent Magnets. (In Russian.) Iu Skakov. *Doklady Akademii Nauk SSSR*, new ser., v. 79, July 1, 1951, p. 77-80.

Metallographic analysis of Fe-Al-Ni alloys by means of optical and electron microscopes provides data for adding to and correcting Bradley and Taylor's diagram for this system. Results are discussed and illustrated.

1290* What Is a Metal? Robert Maddin. *Chemistry*, v. 25, Dec. 1951, p. 18-25. (Reprinted from *Johns Hopkins Magazine*.)

Starts with growth of the metallic crystal, and gives results of physical and mechanical tests run on these single crystals. Illustrated.

1291* The Preparation and the Crystal Structures of Cobalt Nitride, Co_2N, of Cobalt Carbonitrides, $Co_2(C, N)$ and of Cobalt Carbide, Co_2C. J. Clarke and K. H. Jack. *Chemistry & Industry*, Nov. 17, 1951, p. 1004-1005.

10 references.

1292 Spheroidal Cast Irons. Albert M. Portevin. *Metal Progress*, v. 60, Dec. 1951, p. 82.

Discusses metallographic structure of the above.

1293 Metallography at Elevated Temperatures; Possibility of Gaseous Etching in New French Technique. J. Maréchal and M. Doucet. *Metal Treatment and Drop Forging*, v. 18, Dec. 1951, p. 565-571.

Describes a technique and apparatus for examining structural changes of metal specimens at elevated temperatures. Results of work and the possibility of using gaseous etching on samples of Cu are given. Photomicrographs.

1294* Methods for Preparing and Examining Large Metallic Crystals. (In French.) Paul LaCombe. *Métaux: Corrosion-Industries*, v. 26, Oct. 1951, p. 392-409.

Describes 7 different methods for preparing and examining single crystals and polycrystalline specimens. Illustrated. 58 ref.

1295 Asymmetrical Electron Diffraction Effects From Single Crystals of Silver. G. P. Thomson. *Proceedings of the Physical Society*, v. 64, sec. A, Dec. 1, 1951, p. 1113-1124.

Silver crystal surfaces, prepared by either electrolytic etching or electrolytic polishing, were studied by means of the electron-diffraction reflection technique. The fine structure effects showed certain asymmetries which do not immediately follow from Laue diffraction theory. The possible causes of these asymmetries are discussed, and it is concluded that they were probably due to distortion of the silver crystals, or refraction effects.

1296* Study of the Temper Brittleness of Certain Steels by X-Ray Diffraction. (In French.) Adrienne R. Weill. *Revue de Metallurgie*, v. 48, Nov. 1951, p. 853-857.

Discusses results of experiments using X-ray diffraction for distinguishing between a piece of steel in the tough state and the brittle state. Data are tabulated.

1297* Etch Patterns Produced Anodic Attack on Aluminum. Raymond Jacquesson and Jack Manenc. (In French.) *Revue de Metallurgie*, v. 48, Nov. 1951, p. 879-882.

Describes a new process for studying crystal orientation in cold-worked Al. Illustrated.

Miscellaneous Publications

1298 Relationship Between Crystal Lattice Parameter of Austenite and Start of Martensite Transformation in Iron-Carbon Alloys. V. I. Arkharov. Henry Brutcher, Translation

10. *Metallography and Primary Structures*

2696, 9 pages. (From *Doklady Akademii Nauk SSSR*, new ser., v. 70, no. 5, 1950, p. 833-836.)

Previously abstracted from original.

1299 Impregnation of Steel With Cerium. N. T. Gudtsov and G. N. Dubinin. Henry Brutcher, Translation 2750, 23 pages. (From *Izvestiya Akademii Nauk SSSR*, Section of Technical Sciences, Apr. 1951, p. 565-575.)

Describes an experimental investigation of the above. Gives results useful for correcting and supplementing the existing Fe-Ce phase diagram; structure and properties of surface phase; data on case-thickness variation with C content; and scaling resistance of steels containing 0.03-0.15% Ce.

1300 Influence of Small Additions of Boron and Vanadium Upon Crystallization of Steel. S. D. Birk, V. E. Neimark, and R. I. Entin. Henry Brutcher, Translation 2761, 8 pages. (From *Stal*, v. 7, 1947, p. 336-340.)

Presents results of experimental study of effect of B and V upon kinetics and structure of primary crystallization of steel, primary austenite grain, rate of ferrite precipitation, and mechanical properties (hardness) of as-cast steel.

1301 The Uranium-Carbon System. M. W. Mallett, A. F. Gerds, and H. R. Nelson. U. S. Atomic Energy Commission, AECD-3226, Apr. 1, 1951, 32 pages. (UF767 U3a)

Presents results of an investigation of the above system. Gives the constitution diagram on the basis of melting point, X-ray, and metallographic data. Illustrated.

See also:

1164 (microstructure of gray iron)
1171 (grain size of cast Cu-base alloys—effects of other elements)
1186 (Austenite grain size vs. mechanical properties of steel wire)
1304 (solid solutions of other metals in Fe)
1309 (recrystallization structure of drawn Al wire)
1310 (cast-iron microstructures)
1349 (microstructure of Fe-powder sintered bodies)
1352 (microstructure of Al-Cu-Si alloys)
1354 (nodular cast irons)
1366 (microstructure vs. creep resistance of low-alloy steels)
1383 (microstructure of low-alloy steel)
1394 (segregation vs. mechanical properties—cast steel)
1395 (microstructure of Si-Cr cast irons)
1398 (microstructure of Ti C-base ceramals)
1562 (lattice parameter determination)

11. METALS—TRANSFORMATIONS AND RESULTING STRUCTURES

1302* Kinetics of Isothermal Growth of Martensite Crystals. (In Russian.) B. Ia. Liubov. *Doklady Akademii Nauk SSSR*, new ser., v. 78, June 11, 1951, p. 895-898.

The above was theoretically investigated. A series of equations are proposed describing the kinetics involved. These equations are interpreted for different values of the variables.

1303 Nodule Genesis and Growth in Magnesium-Treated Hypoeutectic Irons. R. P. Dunphy and W. S. Pellini. *Foundry*, v. 80, Jan. 1952, p. 82-86, 195, 196, 198-200.

Above features of hypoeutectic Mg treated Fe were studied by examination of specimens quenched at various stages of solidification. It is deduced that nodules develop in close proximity to dendrites at the end-stage of austenite formation, immediately prior to the start of eutectic reaction. Nodule growth is believed to result from the malleablization of ledeburite. Gives cooling curves and microstructures. 11 ref.

1304 Solid Solutions; Classification of the Solubilities of Elements in Iron. Part II and III. I. I. Kornilov. *Iron & Steel*, v. 25, Jan. 1952, p. 25-30. (Translated from *Izvestiia Akademii Nauk SSSR*)

In Part II a classification of solid solutions higher than binary involving iron is presented, based on the atomic diameters of the elements which form continuous (binary) solid solutions with iron and among themselves. Corresponding to the two modifications of iron (α and γ), two classes of continuous solid solutions are considered: ferritic and austenitic. In Part III, from the relation of the atomic diameters of the elements and of iron, a group of elements with a difference of atomic diameters of 8-15% which form binary limited solid solutions with iron is isolated. A systemization of ternary, quaternary, and higher limited solid solutions of ferrite is given on the basis of these elements, and the number of possible systems is calculated. 27 ref.

1305 Recrystallization of Tungsten. A. L. Simmons. *Metal Industry*, v. 79, Dec. 21, 1951, p. 519-520.

Presents results of experimental work on the annealing and recrystallization of, and suitable maximum swaging temperatures for tungsten. Graphed and tabulated.

1306 Effect of Titanium on Gray Iron. D. W. McDowell, Jr., *Metal Progress*, v. 60, Dec. 1951, p. 80.

Tells how Ti produces finer graphite in cast iron and also improves machinability, heat resistance, and corrosion resistance.

1307 Grain-Boundary Diffusion in Metals. R. S. Barnes. *Metal Treatment and Drop Forging*, v. 18, Dec. 1951, p. 531-538.

Reviews past and present investigations on the mechanism of grain-boundary diffusion. An electrolytic method for determining the curve of constant concentration is described. A quantitative study is made from which a number of theories are deduced. Work on the Cu-Ni couple is described and illustrated. 21 ref.

1308 Protecting Refinery Pressure Equipment From Graphitization. D. B. Rossheim, J. J. Murphy, R. H. Caughey, and Q. B. Hoyt. *Petroleum Processing*, v. 6, Dec. 1951, p. 1385-1388.

Presents results of studies of carbon and low-alloy steel deterioration in some catalytic-cracking equipment. Suggestions are given for precautions to be taken and materials for new construction. Causes of cracking, including stresses in bimetallic construction are discussed.

1309* The Recrystallization Texture of Drawn Aluminium Wire. J. Sawkill and N. Thorley. *Philosophical Magazine*, ser. 7, v. 42, Dec. 1951, p. 1369-1372.

Surveys previous literature on the above. Presents results of an investigation which show the existence of a minor (100) component.

1310* Modern Metallurgy of Cast Iron. H. Morrogh. *West of Scotland Iron and Steel Institute Journal*, v. 57, 1949-50, p. 62-80, disc., p. 81-84.

White and gray structures are discussed with particular reference to the method of formation from the liquid state. Eutectic structures, fine graphite, and flake graphite are mentioned. Nodular graphite is dealt with more fully.

Miscellaneous Publications

1311 Kinetics of Graphitization in Cast Iron. B. F. Brown and M. F. Hawkes. *Transactions of the American Foundrymen's Society*, v. 59, 1951, p. 181-198; disc., p. 198-200. (TS200 Am35t)

Discusses the above. The eutectoid decomposition of austenite to graphite and ferrite and also to pearlite was studied in a Mg-treated nodular iron. A possible mechanism for the effects of alloying elements on rates of graphitization is suggested. Data are graphed and tabulated. Micrographs.

1312 Influence of Nickel Upon Diffusion of Carbon in Austenite. M. E. Blanter. Henry Brutcher, Translation 2793, 7 pages. (From *Zhurnal Tekhnicheskoi Fiziki*, v. 20, 1950, p. 217-221.)

Gives results of the above investigation, establishing that the coefficient of diffusion increases with increasing Ni content. (4-18%) in steel.

1313 Zirconium-Titanium System: Constitution Diagram and Properties. Earl T. Hayes. A. H. Roberson, and O. G. Paasche. U. S. Bureau of Mines, Report of Investigations 4826, Nov. 1951, 11 pages. (TN21 Un3r)

The Zr-Ti system was investigated over the entire range of compositions using both graphite-melted and arc-melted alloys. Thermal analysis, resistivity measurements, melting-point studies,

and X-ray analysis were used to determine the phase relationships. Tests on mechanical properties were made. Tables and graphs.

See also:
1239 (diffusion aspects of brazing)
1298 (martensite transformation in Fe-C alloys)
1300 (rate of ferrite precipitation of steel—B and V effects)
1360 (recrystallization of cold-worked steel)

12. METALS—PHYSICAL PROPERTIES AND TESTS

1314* The Change of Wettability of Platinum by the Action of Different Gases. (In Russian.) I. N. Plaskin and S. I. Vladimirov. *Doklady Akademii Nauk SSSR*, new ser., v. 78, June 11, 1951, p. 933-935.

Presents results of a study of the influence of O_2, air, A, N_2, and CO_2 on the surface in relation to the flotation properties of minerals. Data are discussed and charted.

1315* Formulas for Calculation of the Surface Tension of Metals. (In Russian.) L. L. Kunin. *Doklady Adademii Nauk SSSR*, new ser., v. 79, July 1, 1951, p. 93-96.

Surface tensions were calculated using equations proposed by various authors and compared with experimental values for Fe and a wide variety of nonferrous metals. Data are tabulated and discussed. 16 ref.

1316* "Corbino Effect" and Magnetic Resistance Change in Bismuth. (In German.) L. Halpern and K. M. Koch. *Acta Physica Austriaca*, v. 5, Nov. 1951, p. 129-133.

Describes Corbino's modified method of determining Hall constant, and its application to Bi discs at about 90°K. A fiield of only 700 oersteds effected a 51.8% increase in resistance of the full disc, while the resistance increase dropped to 38% when the disc was slit from circumference to center. Includes diagrams.

1317 Thermal Properties of the Alkali Metals. I. The Heats of Reaction of Sodium and Potassium With Water at 25°. II. The Heats of Formation of Some Sodium-Potassium Alloys at 25°. Eugene E. Ketchen and W. E. Wallace. *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5810-5814.

28 references.

1318 Thermal Conductivity of Liquid Sodium and Potassium. C. T. Ewing, J. A. Grand, and R. R. Miller. *Journal of the American Chemical Society*, v. 74, Jan. 5, 1952, p. 11-14.

Conductivity coefficients were measured for liquid Na and K with a longitudinal heat flow apparatus—sodium to 510 and potassium to 610°. A description of an apparatus for accurate measurement of high-boiling metals to 600°C. is presented. The ideality of the pure liquid-metal media is shown by the conformation of the conductivity values to empirical and theoretical postulations. 12 ref.

1319 Magnesium-Cadmium Alloys. II. The Use of the Electrochemical Cell to Determine the Heats, Free Energies and Entropies of Formation of the Solid Alloys in the Temperature Range Above the Order-Disorder Curie Points. Forrest A. Trumbore, W. E. Wallace, and R. S. Craig. **III. Some Calorimetrically Determined Heats of Formation at 25°.** Thomas M. Buck, Jr., W. E. Wallace, and Richard M. Rulon. *Journal of the American Chemical Society*, v. 74, Jan. 5, 1952, p. 132-139.

35 references.

1320 The Vapor Pressures of Tellurium and Selenium. L. S. Brooks. *Journal of the American Chemical Society*, v. 74, Jan. 5, 1952, p. 227-228.

The above was measured with quartz Bourdon gages, at pressures up to about ½ atm. for Te and just over 1 atm. for Se. 17 ref.

1321* The Solubility of Gold. Konrad B. Krauskopf. *Economic Geology and the Bulletin of the Society of Economic Geologists*, v. 46, Dec. 1951, p. 858-870.

Shows that the solubilities of Au, in various solutions, calculated from thermodynamic data agree reasonably well with experimental results. Data are tabulated. 16 ref.

1322* Variation of Resistivity of Thin Metallic Films as a Function of Thickness and of Temperature. (In French.) J. P. Borel. *Helvetica Physica Acta*, v. 24, Sept. 20, 1951, p. 389-400.

Presents results of study of the above for thin films of silver. Data are charted and tabulated.

1323* Some Special Characteristics of Soft Magnetic Materials Used in Instrument Manufacture. G. A. V. Sowter. *Proceedings of the Institution of Electrical Engineers*, v. 98, pt. 2, Dec. 1951, p. 714-727; disc., p. 573-759.

Outlines the merits of a number of high-permeability magnetic alloys under a variety of conditions likely to be met in instrument practice. The properties found with d.c., a.c. and combined a.c.-d.c. operation are indicated, and recommendations are made for the best alloy to be employed in particular circumstances. Information is given on the spread of the magnetic characteristics of Mumetal spiral cores on a commercial scale.

1324* The Influence of Deviations From the Debye Spectrum on the Electrical Conductivity of Metals. F. H. J. Cornish and D. K. C. MacDonald. *Philosophical Magazine*, ser. 7, v. 42, Dec. 1951, p. 1406-1410.

Surveys the above. Data are tabulated and graphed. 14 ref.

1325* On the Calculation of Characteristic Temperatures From the Elastic Constants. M. Blackman. *Philosophical Magazine*, ser. 7, v. 42, Dec. 1951, p. 1441-1442.

Presents a formula for calculating Θ values from elastic constants cases of alloys which are elastically anisotropic. Data are tabulated for Ag, Au, and representative Ag-Au alloys.

1326 Magnetostrictive Vibration of Prolate Spheroids. Analysis and Experimental Results. F. J. Beck, J. S. Kouvelities, and L. W. McKeehan. *Physical Review*, ser. 2, v. 84, Dec. 1, 1951, p. 957-963.

Through an analysis of this vibrational system, a method is developed whereby values may be computed for the incremental permeability, magnetostriction constant, modulus of elasticity, and dissipation constant of the ferromagnetics. Annealed specimens of nickel and of several Ni-Fe alloys, as well as of Ni in the unannealed state, were thus tested.

1327 Thermal Conductivities of Pure Metals at Low Temperatures. I. Aluminum. F. A. Andrews, R. T. Webber, and D. A. Spohr. *Physical Review*, ser. 2, v. 84, Dec. 1, 1951, p. 994-996.

Thermal conductivities of 3 specimens of pure Al were measured in the range 2-20°K. All specimens showed maximum conductivities between 14 and 17°K. Measured values are compared with the theory of Sondheimer. 22 ref.

1328 Sintered Copper With Extremely High Conductivity. F. Pawlek. *Powder Metallurgy Bulletin*, v. 6, Dec. 1951, p. 83.

Briefly discusses and describes experiments run to confirm results of investigators on the effect of O_2 and H_2 on the electrical conductivity of Cu.

1329 The Electrical Resistivity of Gallium and Some Other Anisotropic Properties of This Metal. R. W. Powell. *Proceedings of the Royal Society*, ser. A, v. 209, Nov. 22, 1951, p. 525-541.

It is shown that single crystals of Ga can be produced with considerable ease, and that these crystals show greater anisotropy in their conducting properties than those of other metals. It is believed that thermal conductivity varies as much as does electrical conductivity and that mechanical properties will also prove to be markedly anisotropic. 20 ref.

1330 Electrical Resistivity of Gallium Single Crystals at Low Temperatures. Marianne Olsen-Bär and R. W. Powell. *Proceedings of the Royal Society*, ser. A, v. 209, Nov. 22, 1951, p. 542-550.

A detailed investigation of the above was made over the range 20.4-4.2°K. The anisotropy of this property increases in this region where the resistivity ratios for the 3 specimens are approximately 1:2.1:8 compared with 1:2.1:6.5 at room temperature. Graphs and tables.

1331* Method of Measuring the Electrical Conductivity of Metallic Crystals and Melts. (In German.) Adolph Knapp-

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wost. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie*, v. 55, Oct. 1951, p. 598-600.

In the method described, electrical conductivity of metal may be determined in the range from the melting point to room temperature. The specimen is located in the magnetic field of force of a coil carrying an alternating current. Includes a circuit diagram, graphs, and references.

1332* Flow Method for Determining the Adsorption Times of Gas Molecules on Metal Surfaces. (In German.) Werner Brandt. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie*, v. 55, Oct. 1951, p. 652-654.

Discusses experiments made to measure the adsorption time of a series of gases on Pt-Cu alloy wires.

1333* The Effect of Trace Elements in Pure Copper. (In German.) H. J. Wallbaum. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 4, Oct. 1951, p. 377-383.

Results of experiments with electrolytic Cu wire show that various trace elements greatly affect the electrical properties and crystal structure of copper. Includes graphs, tables, and X-ray diagrams.

1334* Investigation of "Thick" Metal Layers and Their Surface Layers With the Aid of the "Absolute Phase." (In German.) Herwig Schopper. *Zeitschrift für Physik*, v. 130, Oct. 9, 1951, p. 427-444.

Discusses possible new methods for above and describes a process for determining index of the layers. Refractive index of silver and thickness of transition layers (on exposed side of metal layer) were also investigated. Diagrams, tables, and graphs. 16 ref.

1335* Measuring Vapor Pressures and Coefficients of Condensation of Iron, Cadmium, and Silver. (In German.) Günter Wessel. *Zeitschrift für Physik*, v. 130, Oct. 9, 1951, p. 539-548.

Description of procedures includes diagrams, tabulated and graphed data. 20 ref.

1336* Magnetic Susceptibility of Gray Tin. (In German.) G. Busch and E. Mooser. *Zeitschrift für physikalische Chemie*, v. 198, nos. 1-4, Oct. 1951, p. 23-29.

Shows that the above susceptibility is composed of 3 parts, namely: the thermally independent diamagnetism of Sn atoms, the thermally dependent diamagnetism of free charge carriers, and the paramagnetism of Mg ions (if present) acting as acceptors. Includes graphs.

1337* Effect of Impurities on the Initial Permeability of Materials. (In German.) Martin Kersten. *Zeitschrift für physikalische Chemie*, v. 198, nos. 1-4, Oct. 1951, p. 89-106.

Explains theoretically the fact that slight impurities reduce initial permeability of commercially pure Fe more than initial permeability of reversible Ni-Fe alloys containing 40-100% Ni. Charts and diagrams. 19 ref.

Miscellaneous Publications

1338 Contact Resistance—The Contribution of Nonuniform Current Flow. W. B. Kouwenhoven and W. T. Sackett, Jr. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 791-795. (Tk1 Am35tr)

Results of the above study provide an explanation of spreading resistance, and curves are presented for calculating its magnitude for single and multiple constricting contacts.

1339 Single-Domain Structure in Ferromagnetic Materials and Magnetic Properties of Finely Dispersed Substances. E. Kondorskii. Henry Brutcher, Translation 2654, 8 pages. (From *Doklady Akademii Nauk SSSR*, new ser., v. 74, no. 2, 1950, p. 213-216.)

Previously abstracted from original.

Books

1340 Metallurgical Thermochemistry. O. Kubaschewski and E. L. Evans. 368 pages. 1951. Academic Press, New York. (QD511 K95m)

First part discusses the necessary theoretical basis of the above. Part 2 describes the main experimental techniques. Part 3 presents methods of estimating values which for some reason have not been or cannot be determined. Part 4 contains in tabular form the values of thermochemical constants for a large number of elements and compounds of metallurgical importance. Final part gives a few examples of applications of thermochemical methods.

See also:

1158 (fluidity of metals)
1166 (gas absorption in metals)
1195 (physical properties of Ti)
1206 (density of hot-coined alloy steels)
1207 (physical properties of infiltrated materials)
1239 (thermodynamic aspects of brazing)
1287 (thermal expansion of Fe-Ni-Al alloys)
1288 (coercive-force values of Fe-Ni-Al alloy)
1349 (density of Fe-powder sintered bodies)
1365 (plastic deformation vs. resistivity of metals)
1372 (physical properties of nimonic alloys)
1393 (physical properties of Cu, Ag, and Au)
1522 (triboeletric properties of metals)
1769 (absorption of compounds on metal surfaces)
2097 (nuclear properties of Ag and W)
2120 (magnetic hysteresis losses)

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1341 A Piezoelectric Method for Determining Young's Modulus and Its Temperature Dependence. H. E. Stauss, F. E. Martin, and D. S. Billington. *Journal of the Acoustical Society of America*, v. 23, Nov. 1951, p. 695-696.

A resonance method for determining Young's modulus in metals, based on support of the specimen at its central node for longitudinal vibrations, with the supporting rod articulating at its lower end with a piezoelectric crystal, was developed. Utility of the method was extended by adapting it to measurement of changes in Young's modulus with temperature.

1342* Dynamic Coefficient During Concentrated Loading. V. N. Danilov. *Doklady Akademii Nauk SSSR*, new ser., v. 78, June 21, 1951, p. 1135-1136.

The above is defined. Soft steel, red brass, Al, Pb, Sn, and a Sn-Pb alloy are included in the investigation. Data are charted.

1343* The Character of Spontaneous Initial Deformation. (In German.) Gotthold Müller and Werner Engelhardt. *Annalen der Physik*, v. 9, ser. 6, Oct. 15, 1951, p. 357-362.

Describes study of plastic deformation of Cu wire in the range of low shear stresses. Duration of spontaneous elongation is assumed to be functionally related to temperature. Data are graphed.

1344* A Survey of Recent Research on Creep of Engineering Materials. Joseph Marin. *Applied Mechanics Reviews*, v. 4, Dec. 1951, p. 633-634.

48 references.

1345* Influence of Test Conditions on End-Quench Testing of Steels. (In German.) Walter Peter and Adolf Rose. *Archiv für das Eisenhüttenwesen*, v. 22, Sept.-Oct. 1951, p. 303-312.

Tests were done on 6 German low-alloy steels in order to determine the influence of variations of testing conditions on the results. Data are extensively charted; results are discussed. 12 ref.

1346* Creep Tests on Steel Wire at Room Temperature. (In German.) Alfred Krisch. *Archiv für das Eisenhuttenwesen*, v. 22, Sept.-Oct. 1951, p. 313-316.

Tests were made over a period of more than 1000 hrs. on 5 patented steel wires and on one type of wire subjected to a final oil quench. Details of tests are diagramed and tabulated; behavior of the wires in reinforced concrete is discussed. 10 ref.

1347* Mathematics of the Tensile Test. (In German.) Hans Kostron. *Archiv für das Eisenhüttenwesen*, v. 22, Sept.-Oct. 1951, p. 317-324; disc., p. 324-325.

Proposes equation making possible the calculation of various stresses. Data are extensively diagramed; practical application of mode of calculation is indicated. 16 ref.

1348* Correlation Between Stress and Deformation Gradient. Part 2. Influence of Form and Scale. (In German.) Franz Bollenrath and Alex Troost. *Archiv für das Eisenhüttenwesen*, v. 22, Sept.-Oct. 1951, p. 327-335.

Theoretically investigates and diagrams a new method for designating the influence of irregular stress and deformation distribution upon the hindering of plastic deformation. The terms used are indexed. Practical application is suggested. 11 ref.

1349* The Behavior of Sintered Iron During Nitriding. (In German.) Werner Koster and Josef Raffelsieper. *Archiv für das Eisenhüttenwesen*, v. 22, Sept.-Oct. 1951, p. 337-341.

Microstructure, density, hardness, and bend strength of various Fe-powder sintered bodies were determined. Results are tabulated, charted, and illustrated by photomicrographs.

1350* Wear From the Manufacturers' View-Point. G. A. P. Hunt. *Australasian Engineer*, Nov. 7, 1951, p. 62-69.

Discusses the meaning of wear and how it can be measured. How wear is related to microstructure, to the pressure between the rubbing surfaces, and to casting cross sectional area was studied. Wear properties of various cast-iron structures are reported.

1351* Increase of Fatigue Strength of Welded Joints by Surface Peening. I. V. Kudriatsev and N. M. Savvina. *Avtogennoe Delo*, v. 22, Apr. 1951, p. 8-12.

Cylindrical, plate, and channel-beam fatigue specimens were prepared by butt and lap arc-welding and were given various stress relief and peening treatments. Data are discussed, tabulated and charted. 14 ref.

1352* A New Aluminum Alloy of the Al-Cu-Si Type. (In German.) W. Thury and H. Landerl. *Berg und Hüttenmannische Monatsheft der Montanistischen Hochschule in Leoben*, v. 96, Oct. 1951, p. 201-205.

Study of strength properties and microstructure of 8 Al alloys containing 1.32-2.43% Si and 1.47-2.39 Cu shows that they are suitable as cast alloys within certain limits and that their good properties and anodic oxidizability make them promising malleable alloys. Includes graphs, tables, and photomicrographs. 14 ref.

1353* Some Jominy Tests on Fine Carbon Steel and Special Low-Alloy Steel. (In French.) *Circulaire d'Informations Techniques*, v. 8, Nov. 1951, p. 1283-1293.

Presents results of above in which 5 types of steel were used. Tests were conducted on various special heats of steel. Data are tabulated and charted.

1354* Study of Some Properties of Nodular Graphite Cast Irons. (Concluded.) (In French.) Marcel Ballay, Raymond Chavy and Jacques Grilliat. *Fonderie*, Oct. 1951, p. 2636-2651; disc., p. 2651-2652.

This concluding article discusses the above with respect to mechanical properties, technique of tensile testing, comparison with properties of American malleable cast iron, and comparison of cast iron and steel resilience. Includes photomicrographs and tables.

1355* Hard Metals (Sintered Carbides) as Tools for Cold-Working Operations. (In Czech.) M. Petrdlik. *Hutnické Listy*, v. 6, Oct. 1951, p. 484-489.

Deals with production of hard alloys of the WC-Co type containing up to 30% Co. Variations in mechanical properties with Co content are described in detail. Three examples of the use of hard metals containing a high percentage of Co for cold-working operations are described. Diagrams, graphs, tables, and illustrations.

1356* Directional Hardness Differences in Silicon Carbide Crystals. W. Stern. *Industrial Diamond Review*, new ser., v. 11, Nov. 1951, p. 237-239; Dec. 1951, p. 255.

Describes tests on the above. The grinding and polishing direction is a factor in the life and performance of various carbides.

1357 English Use Boron in Normalized and Drawn Heavy Sections. W. E. Bardgett. *Iron Age*, v. 169, Jan. 10, 1952, p. 81-84.

Discusses and evaluates the addition of B to low-alloy and low-carbon steels. Describes the effect on tensile and yield stress. Notes the effect of Mo in varying amounts.

1358 Poisson's Ratio; Variations in Cast Iron for Ingot Moulds. J. Woolman. *Iron and Steel*, v. 24, Dec. 15, 1951, p. 594-596.

It is important to have some knowledge of Poisson's ratio so that an estimation of stresses induced in ingot molds will be as accurate as possible. An investigation was made and results are tabulated and discussed.

1359 Properties and Application of Ductile Iron. G. L. Cox. *Iron and Steel Engineer*, v. 28, Dec. 1951, p. 75-83; disc., p. 83-84.

Surveys the above. Chemical composition, mechanical properties, heat treatment effects, and resistance to corrosion are discussed. Tables and graphs. 12 ref.

1360 Softening of Metals During Cold-Working. N. H. Polakowski. *Journal of the Iron and Steel Institute*, v. 169, Dec. 1951, p. 337-346.

A theory relating indentation hardness and energy stored in a cold-worked metal is put forward as a tentative explanation of both the Bauschinger effect and work-softening. To satisfy this theory, quenched and tempered steels should soften during the early stages of cold-working, and they are shown experimentally to do so. This accounts for the low rate of work-hardening during reversed- and cross-rolling of sheets, reversed deep drawing, and during cold-working and fatigue testing of heat-treated steels. The softening effect provides an explanation of the recrystallization and mechanical properties of single and polycrystalline metals after reversed deformation. 48 ref.

1361 Use of Rare Earth Metals in Magnesium Casting Alloys. J. C. McDonald. *Light Metal Age*, v. 9, Dec. 1951, p. 13-14, 16.

Discusses the characteristics sought in casting alloys for service at elevated temperatures. Gives mechanical properties and behavior in the foundry of Mg-rare earth metal alloys. Gives advantages over Mg-Al-Zn type alloys.

1362 The Hardness Test as a Measure of Micro-Porosity in Aluminum and Magnesium Castings. Harry Czyzewski. *Light Metal Age*, v. 9, Dec. 1951, p. 24, 26.

Discusses method utilizing simple hardness testing and charting of data for the control of microporosity. Considerably simplifies the production control of this factor. Gives advantages and practical applications of this method.

1363 Scales for Determining Stiffness and Strength of Structural Metals. *Materials & Methods*, v. 34, Dec. 1951, p. 107.

A series of logarithmic scales arranged to provide a means for finding the relative sheet, plate, or beam thickness required for various metals of equal stiffness or equal strength, respectively.

1364 Magnesium and Its Alloys in 1951. R. G. Wilkinson. *Metallurgia*, v. 44, Dec. 1951, p. 299-302.

Reviews the present status of Mg. Reference is made to recently developed alloys with improved mechanical properties which find increasing application in many spheres. Discusses casting and wrought alloys, and argon-arc welded Mg-alloy tubing.

1365* Influence of Surrounding Medium on Plastic Deformation of Metals. (In Italian.) Georges Masing. *Metallurgia Italiana*, v. 43, Nov. 1951, p. 467-470.

Conclusions of Rehbinder and coworkers on above influence are confirmed, except for effect on electrical resistance. Presents theoretical analysis of the observations.

1366 Influence of Microstructure on Creep Resistance. Georges Delbart and Michael Ravery. *Metal Progress*, v. 60, Dec. 1951, p. 62-68.

Presents results of an investigation on the above. Material used was a Cr-Mo steel. Tests showed that there was a strong influence of microstructure on the surface performance of low-alloy, high-temperature steels. Data are tabulated and graphed. Micrographs.

1367 Simple Tester for Hardness of Hot Materials. R. F. Domagala and W. R. Johnson. *Metal Progress*, v. 60, Dec. 1951, p. 72-73.

Describes a rapid, reproducible method for testing hot hardness

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of materials at temperatures approaching their melting points. Illustrations and diagram. Examples of tests on Mo, Si, and VSi_2 are shown.

1368 Jigs for Positioning Keyhole Notch. C. D. Foulke. *Metal Progress*, v. 60, Dec. 1951, p. 81.

Describes and illustrates 2 jigs for the uniform preparation of keyhole notch-impact specimens.

1369 High Purity Zirconium Metal. F. B. Litton. *Metal Progress*, v. 60, Dec. 1951, p. 83-86.

Presents results of an investigation on the above. The work-hardening curves for iodide and arc-melted iodide zirconium were similar, except that approximate maximum hardnesses were attained at 70 and 60% cold reduction, respectively. The maximum hardness was Rockwell A-52 for both materials after 90% cold reduction. The penetration of O_2 into Zr at 1020, 1380 and 1740°F, was determined for 2-hr. heating periods in still air. Hardness measurements showed that approximately 0.35-mm. penetration occurred at 1380 and 1740°F. Micrographs.

1370 Shock Wave Propagation in Metals. Werner Goldsmith. *Metal Progress*, v. 60, Dec. 1951, p. 92-96.

Discusses the above. Shock loading represents the exact opposite of static loading and consists of the instantaneous application of an external force to a structural member. Types of waves resulting from impact loading are compression waves, rarefaction, shear, bending, and two types of surface waves. Tests were conducted on mild steel.

1371 Strains and Stresses. *Metal Progress*, v. 60, Dec. 1951, p. 162, 164. (Condensed from "Concentration of Strains and Stresses at Large Plastic Strains," Ya. B. Fridman and T. K. Zilova, *Doklady Akademii Nauk SSSR*, new ser., v. 73, 1950, p. 1185-1188.)

The stress and strain conditions during elastic deformation of notched metal specimens were studied in detail.

1372 Properties of Nimonic Alloys. *Metal Progress*, v. 60, Dec. 1951, p. 80-B.

Presents charts and tables on the chemical composition, physical and mechanical properties and heat treatments of Nimonic Alloys.

1373 The Protection of Metallic Surfaces by Chromium Diffusion. Part V. Properties of Chromised Steel. R. L. Samuel and N. A. Lockington. *Metal Treatment and Drop Forging*, v. 18, Dec. 1951, p. 543-548, 556.

Covers hardness, ductility and other mechanical properties; weldability, and original data on the resistance to corrosion and oxidation in various media. (To be continued.)

1374* Determination of Residual Strains in Sintered Pieces. (In French.) J. Pomey, F. Goutel, and L. Abel. *Métaux: Corrosion—Industries*, v. 26, Sept. 1951, p. 347-356; Oct. 1951, p. 377-391.

Macroscopic strains due to anisothermic hardening were investigated. Part I reviews the problem with respect to former and present methods. Part 2 discusses superficial measures deduced from Hertzian hardness with respect to preliminary strains, explored points, and corresponding Mohr circles; superficial strains after cementation and hardening, and application to carbonitrided surfaces. Part 3 describes methods for determining strains inside sintered bodies. Part 4 discusses applications of the various methods. (Latter 2 parts are in the Oct. issue.)

1375* Abrasion and Polishing, Friction and Wear. P. Dinichert. *Microtecnic* (English Ed.), v. 5, Sept.-Oct. 1951, p. 225-232.

Points out the necessity for considering submicroscopic or even atomic dimensions when questions on the above are dealt with. Reference to this phenomena in metals is made. Graphs and diagrams.

1376 The Creep of Metals and Creep-Resistant Alloys. A. H. Sully. *Murex Limited Review*, v. 1, no. 9, 1951, p. 211-228.

Analyzes creep in metals. Examines the factors which influence creep, and compositions of creep-resistant alloys. Discusses utilization of creep-test data as it affects engineering design. Discusses structural phenomena and physical theory of creep.

1377 Formula for Creep Curves of Metals. E. N. Da C. Andrade. *Nature*, v. 168, Dec. 8, 1951, p. 1007.

Briefly discusses and compares a 3-constant and a 4-constant formula for the above.

1378* Internal Hydrostatic Pressure Testing as a Measure of Performance Values of Oil-Well Casing and Tubing. H. G. Texter. *Oil and Gas Journal*, v. 50, Jan. 7, 1952, p. 78-85.

Discusses acceptable methods of determining whether any given lengths of casing or tubing are capable of withstanding the forces to which they will be subjected in oil-well service. Then, after reviewing presently known methods, arguments are presented to show that high-internal-pressure testing is the most reliable and least expensive single method of checking performance values. Includes macrographs.

1379 The Luders Deformation of Mild Steel, *Proceedings of the Physical Society*, v. 64, ser. B. Dec. 1, 1951, p. 1085-1086.

Outlines experiments on the above, extended to the "blue-brittle" range—around 200°C. Here the deformed area just beyond the Lüders front ages very rapidly during the test, so that yield stress in this region is much above applied stress.. After testing, marked curvature remains in the sample.

1380 An Improved Creep Measuring and Recording System. J. W. Huffman. *Product Engineering*, v. 23, Jan. 1952, p. 172-174.

Describes, diagrams, and illustrates the above, developed by Engineering Research Laboratory, North American Aviation, Inc.

1381* Method of Identifying the Crystallographic Characteristics of Deformation and Fracture in Polycrystalline Solids. (In German.) C. A. Zapffe and F. K. Landgraf. *Revue de Métallurgie*, v. 48, Nov. 1951, p. 811-821.

Describes "fractographic" procedure. The crystallographic characteristics of Bi and Sb were studied in this way. Includes fractographs, sketches, and tables. 17 ref.

1382* Results of Fatigue Tests Under Increasingly Heavy Loads. (In French.) Marcel Prot. *Revue de Métallurgie*, v. 48, Nov. 1951, p. 822-824.

Briefly reviews the above, presenting advantages of this technique. Data are charted for various steels, Al and Mg alloys.

1383* Micrographic Study of the Temper Brittleness of Low Alloy Carbon Steel. (In French.) *Revue de Métallurgie*, v. 48, Nov. 1951, p. 825-852.

Treats the above in detail, presenting some new information concerning micrographic technique and results and possibilities of its application to detecting temper brittleness and its causes. Includes micrographs and tables. 16 ref.

1384* Application of the Microsclerometric Meyer Analysis to Temper Brittleness. (In French.) H. Bückle. *Revue de Métallurgie*, v. 48, Nov. 1951, p. 858-863.

Discusses and analyzes results of experiments of other investigators on above for low-alloy steels. Includes tables and graphs. 24 ref.

1385* Influence of Temperature on the Elastic Constants of Metals and Alloys. (In French.) Georges Vidal, Pierre Lescop, and Louis Raymondin. *Revue de Métallurgie*, v. 48, Nov. 1951, p. 864-874; disc., p. 874.

Presents a brief discussion of the above from the physical, metallographic, and mechanical points of view. Includes tables, diagrams, and graphs. 14 ref.

1386* Study of the Internal Disorientation in Aluminum Magnesium Alloy Single Crystals Subjected to Plastic Deformation. (In French.) J. Hérenguel and P. Lelong. *Revue de Métallurgie*, v. 48, Nov. 1951, p. 875-878.

Describes two methods for the above: use of Lacombe's etching reagent and anodic oxidation of thin films of an Al+3% Mg alloy. Includes photomicrographs and diagrams.

1387* Creep and Relaxation of Drawn Wires. (In French.) Robert de Strycker. *Revue de Métallurgie*, v. 48, Nov. 1951, p. 888-893, disc., 893.

Outlines several experiments on the above including details of

test procedure and influence of natural and artificial aging on relaxation properties. Data are tabulated and discussed for patented and drawn steel wire.

1388* Distortion and Failure of Steam Turbines and Their Prevention. (In German.) Ernst Pohl. *Stahl und Eisen*, v. 71, Dec. 6, 1951, p. 1375-1379.

Discusses warpage of shafts and its elimination; cracks extending from the age-hardened zone and the rim caused by prevention of expansion; and fatigue failure of moving blades caused by vibration, notches, and stress corrosion. Methods of alleviation are discussed. Illustrations show various failed pieces.

1389* Some Experience With Boiler Plate in Penstock Construction. W. Müller. *Sulzer Technical Review*, no. 2, 1951, p. 12-24.

Cites examples of difficulties encountered with plate material for high-pressure pipe lines, and gives suggestions as to how they can be avoided or remedied. Includes information on mechanical properties, specifications, inspection, welding, and heat treatment.

1390* Precipitation-Hardening Stainless Cuts Hand Work and Rejects on Aircraft Parts. F. Robert Kostock. *Western Metals*, v. 9, Dec. 1951, p. 32-34.

Describes a new Cr-Ni stainless steel produced by Armco Steel Corp. It can be heat treated at relatively low temperatures to high strength and hardness. Pickling practices, welding techniques and typical applications of this new alloy are discussed.

1391* Development of Low Alloy High Tensile Structural Steel. I. M. Mackenzie and J. M. Pow. *West of Scotland Iron and Steel Institute Journal*, v. 57, 1949-50, p. 85-116; disc., p. 117-124.

The effect of composition and heat treatment on resistance to plastic deformation, resistance to rupture, ability to relieve local stress concentrations, and ease of fabrication are discussed with particular reference to economic considerations. The importance of basing design on a proof-stress criterion in order to obtain the maximum benefit from high-tensile steels is emphasized. Recent developments in the C-Mn and Mn-Mo type of steels are reviewed.

1392* Symposium on Residual Elements in Steel. Factors Affecting the Rolling and Hot Working of Mild Steel Plates. E. C. Houston. **The Effect of Residual Elements in Steel on the Manufacture of Steel Tubes.** W. A. Smith. **Residual Elements in Steel.** H. Harris. *West of Scotland Iron and Steel Institute Journal*, v. 57, 1949-50, p. 193-235; disc., 236-241.

Discusses causes of defects which may arise during the hot processing and welding of mild-steel plates and tubes. Mentions effects of high-sulfur resulting from pick-up from the furnace atmosphere or from segregation. Stresses the effect of residual alloys. Small quantities of Sn, Cu, and Ni were shown to have a bad effect as determined by hot-bend tests. Discusses method of scale formation and the formation of low-melting-point constituents in the scale resulting in grain-boundary attack. Results are tabulated, graphed, and illustrated.

1393* The Relationships of Properties in the Series of Metals Copper-Silver-Gold. Sh. Ia. Korovskii. *Zhurnal Obshchei Khimii*, v. 21(83), Mar. 1951, p. 429-432.

The regularities and variations of mechanical and physical properties of this series of metals are discussed. Data are tabulated.

Miscellaneous Publications

1394 Mechanical Properties of Cast Steel as Influenced by Mass and Segregation. John F. Wallace, John H. Savage, and Howard F. Taylor. *Transactions of the American Foundrymen's Society*, v. 59, 1951, p. 223-242; disc., p. 242-243. (TS200 Am35t)

Presents an investigation of the above on 4 heats of various low-alloy steels. Data are tabulated and graphed. Microphotographs.

1395 Silicon-Chromium Alloy in Complicated Iron Castings. Ralph A. Clark. *Transactions of the American Foundrymen's Society*, v. 59, 1951, p. 401-409; disc., 409-411. (TS200 Am35t)

Four automobile cyclinder castings were poured from cylinder grades of cast iron alloyed in various ways. Mechanical properties were determined for the various specimens. Variations in cooling rate brought about wide variations in microstructure and hardness. Data are tabulated. Microphotographs.

1396 A Castability and Property Comparison of Several Magnesium-Rare Earth Sand Casting Alloys. K. E. Nelson and F. P. Strieter. *Transactions of the American Foundrymen's Society*, v. 59, 1951, p. 532-543; disc., p. 543-545. (TS200 Am35t)

Castability and tensile and creep properties of aircraft engine castings made from a group of Mg-rare earth alloys were investigated. Data are tabulated and graphed. Micrographs.

1397 Influence of Roughness and Oxidation on Wear of Lubricated Sliding Metal Surfaces. C. B. Davies. *Annals of the New York Academy of Science*, v. 53, art. 4, June 27, 1951, p. 919-935. (Q11 N49a)

Measurements were made, at room temperature, of the wear of a flat steel annulus flooded with lubricant and pressing against the lower end of a small vertical cylindrical tungsten-carbide pin. In another apparatus reciprocating motion produced rubbing of Ag-Cu and mild steel–Ni-Cr-steel combinations in O_2, N_2, or air. Effects of surface-active agents and of other chemicals on wear and corrosion were studied. Results are charted, tabulated, and illustrated.

1398 Elevated Temperature Properties of Titanium Carbide Base Ceramals Containing Nickel or Iron. A. L. Cooper and L. E. Colteryahn. National Advisory Committee for Aeronautics, Research Memorandum E51110, Dec. 3, 1951, 47 pages. (TL782 Un3rm)

Presents results of an investigation on the above. The properties studied were oxidation, modulus of rupture, tensile strength, and thermal-shock resistance. In addition to elevated-temperature properties, metallographic structure was studied. Tables, graphs, and micrographs. 13 ref.

1399 Flexural Fatigue Strengths of Riveted Box Beams—Alclad 14S-T6, Alclad 75S-T6, and Various Tempers of Alclad 24S. I. D. Eaton and Marshall Holt. National Advisory Committee for Aeronautics, Technical Note 2452, Nov. 1951, 25 pages. (TL570 Un3t)

Presents results of an investigation of the above. Results are charted, tabulated, and illustrated. 11 ref.

1400 A Study of Elastic and Plastic Stress Concentration Factors Due to Notches and Fillets in Flat Plates. Herbert F. Hardrath and Lachlan Ohman. National Advisory Committee for Aeronautics, Technical Note 2566, Dec. 1951, 23 pages. (TL570 Un3t)

Six large 24S-T3 Al-alloy-sheet specimens containing various notches or fillets were tested in tension to determine their stress concentration factors in both the elastic and plastic ranges. Diagrams and graphs. 12 ref.

1401 A Study of Slip Formation in Polycrystalline Aluminum. Aldie E. Johnson, Jr., and S. B. Batdorf. National Advisory Committee for Aeronautics, Technical Note 2576, Dec. 1951, 18 pages. (TL570 Un3t)

Experimental results are presented which shed light on the assumptions that have been made in several attempts to bridge the gap between physical and mathematical theories of plasticity. The experimental results are compatible with, but do not necessarily verify, the conception that plastic deformation in strain-hardening materials is primarily due to slip. Photomicrographs.

1402 On the Angular Distribution of Slip Lines in Polycrystalline Aluminum Alloy. John M. Hedgepeth, S. B. Batdorf, and J. Lyell Sanders, Jr. National Advisory Committee for Aeronautics, Technical Note 2577, Dec. 1951, 18 pages. (TL570 Un3t)

The present study is essentially an extension of previous work on the above, and represents an attempt to assess quantitatively the adequacy of a model used by examining the statistical distribution of slip angles–those angles which express the orientation of slip lines. Theoretical distributions are derived on the basis of the model and are compared with an experimental distribution obtained from previous investigations. Photomicrographs.

13. *Metals—Mechanical Properties and Tests*

Books

1403 Theory of Perfectly Plastic Solids. William Prager and Philip G. Hodge, Jr. 264 pages. 1951. John Wiley & Sons, New York.

Presents a general introduction to the above. Covers the basic concepts, trusses and beams, torsion of cylindrical or prismatic bars, general theory of plane strain and extremum principles. Treatment is mathematical. Chapter problems.

1404 Creep of Metals. L. A. Rotherham. 80 pages. 1951. Institute of Physics, London. (TA460 R74c)

Covers the following: characteristics of the creep curve, crystalline flow, metallographic features of creep, grain boundary creep, transient creep, steady-state creep, creep testing, and development of creep-resistant alloys. 4-page bibliography.

See also:

1143 (effect of Ce on ductility of steel)
1154 (mechanical properties of Cu alloy castings)
1175 (mechanical properties of Cu alloy forgings)
1186 (austenite grain size vs. mechanical properties of steel wire)
1188 (sub critical annealing treatment of Al mechanical properties of stretch-formed Al)
1193 (theory of plasticity applied to machining)
1195 (mechanical properties of Ti)
1206 (mechanical properties of hot-coined alloy steels)
1207 (mechanical properties of infilterated materials)
1208 (shear stress of Redux points)
1226 (mechanical properties of low-alloy steels)
1235 (mechanical properties of stainless welders)
1244 (mild-steel welds)
1253 (strength properties of heat-treated steels)
1281 (hardness and wear resistance of sprayed metal coatings)
1296 (temper brittleness of steels)
1300 (hardness of steel—B and V effects)
1306 (Ti in gray iron—improved properties)
1313 (mechanical properties of Zr-Ti alloys)
1329 (mechanical properties of Ga)
1405 (stresses and strains in cast iron pipe joints)
1406 (mechanical properties of Ni cast irons)
1423 (research on creep of metals)
1524 (hardness and wear testers)
1538 (hardness-testing instruments)
1540 (plastic-wave propagation in high-speed testing)
1546 (new tensile-testing machine)
1556 (endurance-testing method)
1587 (mechanical properties of boron steels)
1588 (mechanical properties of steel)
1589 (mechanical properties of steels)
1678 (stress analysis of gas turbines)
1768 (surface films vs. friction and wear of solids)
1769 (wear of steel bearings with different lubricants)
1772 (friction coefficient of hydrocarbons vs. steel and Al)

14. CORROSION

1405* Performance Studies on Sulfur Jointing Compounds. Raymond B. Seymour, Walter Pascoe, W. J. Eney, A. C. Loewer, Robert H. Steiner, and R. D. Stout. *Journal, American Water Works Association*, v. 43, Dec. 1951, p. 1001-1014.

Discusses the problems of disintegration, stress and strain, and corrosion of cast-iron pipe cemented joints made with sulfur compounds. Illustrations and graphs. 24 ref.

1406 How Austenitic Nickel Cast Iron Can Serve as an Alternate for Caustic Manufacture. H. O. Teeple. *Chemical Engineering*, v. 58, Dec. 1951, p. 286.

Discusses some mechanical properties and the corrosion resistance of Ni-Resists, a series of austenitic Ni cast irons.

1407 Cast Alloy Reference Sheet. N. S. Mott. *Chemical Engineering Progress* (Engineering Section), v. 47, Dec. 1951, p. 654.

Covers miscellaneous properties of low-carbon 25%-Cr, 12%-Ni steel. Emphasis is on corrosion resistance—qualitative resistance to a large number of common chemicals and industrial materials being given.

1408 Aluminum Alloys for Handling and Storage of Fuming Nitric Acid. W. W. Binger. *Corrosion* (News Section), v. 8, Jan. 1952, p. 1.

Gives results of tests showing the resistance of Al to corrosion by HNO_3.

1409 The Mechanism of Scale Formation on Iron at High Temperature. B. W. Dunnington, F. H. Beck, and M. G. Fontana. *Corrosion* (Technical Section), v. 8, Jan. 1952, p. 2-13.

Describes procedure and results of research on the above. Proposes a new mechanism for high-temperature oxidation of Fe. Discusses film formation, and shows photomicrographs of oxide scale on Armco iron. 18 ref.

1410 Corrosion by Some Organic Acids and Related Compounds. H. O. Teeple. *Corrosion* (Technical Section), v. 8, Jan. 1952, p. 14-27; disc., p. 27-28.

Discusses the results of corrosion tests in various organic acids, principally those of the lower aliphatic series. Aqueous solutions of the acids and mixtures are considered. Related compounds, such as aldehydes, ketones, esters, and anhydrides are also discussed. Materials of construction include the stainless steels, Cu and Cu-base alloys, Ni and Ni-base alloys.

1411 Some Aspects of Ship Bottom Corrosion. Paul Ffield. *Corrosion* (Technical Section), v. 8, Jan. 1952, p. 29-48.

Discusses the above in regard to pitting corrosion of carbon and low-alloy steels and its causes. Effects of stray currents, galvanic currents, mill scale, and Cu-bearing paint were investigated. Discusses cathodic protection. Illustrated. 43 ref.

1412 Contribution to the Theory of Cathodic Protection. Carl Wagner. *Journal of the Electrochemical Society*, v. 99, Jan. 1952, p. 1-12.

Distribution of the electrical potential inside an electrolytic solution was calculated for typical cases of cathodic protection with the aid of an auxiliary metal. These calculations are used to work out equations and diagrams which permit prediction of the maximum extension of metallic surfaces for which cathodic protection can be accomplished. 16 ref.

1413 Resistance of Titanium to Sulfuric and Hydrochloric Acids Inhibited by Ferric and Cupric Ions. Joseph R. Cobb and Herbert H. Uhlig. *Journal of the Electrochemical Society*, v. 99, Jan. 1952, p. 13-15.

Fe^{+++} and Cu^{++} ions are effective inhibitors for the corrosion of Ti in boiling 10% H_2SO_4 and boiling 10% HCl. Although the inhibitors are consumed as Ti corrodes, the consumption is moderate, particularly at the higher inhibitor concentrations corresponding to low corrosion rates. The primary mechanism, as indicated by potential measurements, is believed to involve adsorption of FE^{+++} or Cu^{++} on the metal surface with accompanying satisfaction of surface valences and formation of a dipole layer with negative charge outward accounting for a noble potential.

1414 Metal-Solution Potentials of Nickel in Foreign Ion Solutions and the Mechanism of Nickel Corrosion. D. MacGillavry, J. H. Rosenbaum, and R. W. Swenson. *Journal of the Electrochemical Society*, v. 99, Jan. 1952, p. 22-27.

Phase boundary potentials of Ni in various aqueous solutions, practically free from Ni ions, were measured. The Ni-solution potentials in air may reach high positive potentials. The potentials of Ni vs. solution in an inert gas reach stationary values after several hours, depending upon the pH. The final potentials remain negative with respect to the standard hydrogen electrode. The role played by O_2 in influencing the potentials has an interesting bearing on the initial stages of the corrosion of Ni. 12 ref.

1415* The Protection of Steel by Sprayed Aluminum. W. E. Ballard. *Electroplating and Metal Finishing*, v. 4, Dec. 1951, p. 395-399.

A mechanism is postulated for the formation of the rust stains which sometimes appear on Al-sprayed steel, and methods for avoiding the staining are suggested.

1416 Relations Between Solution Potentials and Susceptibility of Stainless Steel to Selective Corrosion. L. R. Standifer, F. H. Beck, and M. G. Fontana. *Engineering Experiment Station* (Ohio State University), v. 23, Oct. 1951, p. 17-19, 47.

Discusses pitting and intergranular corrosion. Gives experimental procedures and results. Diagrammed.

1417 Corrosion Resistance of Zirconium. Robert J. Bumbaugh. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2878-2880.

Gives results of an investigation to determine the effect of small amounts of O_2, N, C, and Hf on the above. Tabulated data.

1418 Corrosion of Steel in Molten Sulfur. Andrew Dravnieks. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2897-2900.

Clarifies the fundamental mechanisms of sulfide formation on steel. Covers both the chemical and mechanical processes. Gives kinetic constants and describes film structure.

1419 Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 75A-76A, 78A.

Reviews a Russian report on the effect of acid concentration on the corrosion rate of carbon steels.

1420 Progress in Corrosion Prevention. W. H. Vernon. *Metal Progress*, v. 60, Dec. 1951, p. 80-81.

Discusses the use of $NaCrO_4$, sodium benzoate, and $NaNO_2$ as corrosion inhibitors for steel and cast iron.

1421* Effect of Dilute Sulfuric Acid on Magnetized Iron. II. (In German.) G. Wagner. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 82, Oct. 15, 1951, p. 774-784.

Presents results of a further study of "magnetolysis" in order to investigate the source of the oxygen evolved when magnetized iron is treated with H_2SO_4. Includes tabular data and a diagram. 23 ref.

1422* H_2S and CO_2 Corrosion of Carbon Steel in Natural-Gas Processing Plants. D. E. McFaddin. *Oil and Gas Journal*, v. 50, Dec. 13, 1951, p. 97-98.

Presents general conclusions derived from a study on the above.

1423* The British Non-Ferrous Metals Research Association. G. L. Bailey. *Research*, v. 4, Dec. 1951, p. 569-572.

Reviews corrosion investigations carried on by the above association on galvanized steel and copper pipes. A brief discussion of the researches on creep of metals is also given.

1424* Testing Wire Rope Lubricants. L. A. Bushell and P. Marais. *South African Mining and Engineering Journal*, v. 62, Oct. 20, 1951, p. 291, 293.

An investigation of corrosion and lubrication of wire ropes in Free State gold mines. Gives method of testing, description of apparatus, preliminary experiments, comparison of lubricants and results.

1425* Cathodic Protection of Tank Bottoms. *World Oil*, v. 134, Jan. 1952, p. 212-213.

Above protection system is said to cost about 1½% of the replacement cost per year. Diagrams and illustrations show design of such systems.

1426* Solution of Copper in Nitric Acid. II and III. (In German.) T. G. Owe Berg. *Zeitschrift für anorganische und allgemeine Chemie*, v. 266, Oct. 1951, p. 118-139.

Describes, in Part II, studies on the solubility rate of Cu in different concentrations of HNO_3 at temperatures ranging from −10 to +30°C. The experiments described in Part III were made with the specimen immersed in HNO_3 in different ways as well as without stirring the acid. Data are graphed and tabulated. 21 ref.

1427* The Rate of Solution and Solution Potentials of Iron. (In Russian.) Ia. V. Durdin and M. A. Oranskaia. *Zhurnal Obshchei Khimii*, v. 21(83), Apr. 1951, p. 604-614.

Rate of solution and the solution potentials of Armco iron and commercial roofing iron in 10N HCl and H_2SO_4 were determined. Data are discussed, tabulated, and charted. 11 ref.

Miscellaneous Publications

1428 On the Electrochemical Character of the Corrosion of Metals in Liquid Dielectrics. L. G. Gindin. Henry Brutcher, Translation 2644 ,7 pages. (From *Doklady Akademii Nauk SSSR*, new ser., v. 73, no. 3, 1950, p. 515-518.)

Previously abstracted from original.

1429 Study of Passivity of Stainless Steel. G. P. Maitak and N. N. Gratsianskii. Henry Brutcher, Translation 2777, 8 pages. (From *Zhurnal Prikladnoi Khimii*, v. 24, May 1951, p. 545-547.)

Results of a study of the suitability of 18-8 Ti steel as a material for pickling tubs. Presents data on time dependence of electrode potential and corrosion in 4 different solutions.

See also:

1235 (resistance to corrosion of stainless welds)
1258 (corrosion of metal surfaces of boilers)
1298 (sealing resistance of Ce steels)
1359 (corrosion resistance of ductile iron)
1397 (oxidation effects on wear of lubricated metal bearings)
1398 (oxidation of Ti C-base ceramals)
1451 (analysis of Li—use in corrosion studies)
1584 (corrosion of Al in various applications)
1763 (corrosion of engine parts from oil additives)
1769 (rust-inhibiting action of lubricant additives)
2188 (corrosion-testing apparatus)

15. ANALYSIS—CHEMICAL AND PHYSICAL

1430* Electrode Polarization on the Dropping Mercury Cathode During Electroreduction of Nickel and Cobalt in Potassium Tartrate Solution. P. N. Kovalenko and L. S. Nadezkina. *Doklady Akademii Nauk SSSR*, new ser., v. 78, June 21, 1951, p. 1165-1168.

The influence of pH and concentration of the tartrate solution on polarization was investigated. Data are discussed and charted.

1431* The Determination of Methyl α-Chloro-Acrylate in the Atmosphere. J. Haslam, S. M. A. Whettem, and W. W. Soppet. *Analyst*, v. 76, Nov. 1951, p. 628-634.

Colorimetric and volumetric methods for the above are described.

1432* The Determination of Alcohol, Ether and Water in Ternary Mixtures. H. W. Hudgson and J. H. Glover. *Analyst*, v. 76, Nov. 1951, p. 635-643.

A method is described for analysis of all mixtures of alcohol, ether, and water with an accuracy of 0-2%. The composition is obtained from a calibration graph constructed from data obtained by boiling-point determinations and "cloud-point" titrations.

1433* The Estimation of Tantalum in Mixtures by Neutron Activation Analysis. J. V. P. Long. *Analyst*, v. 76, Nov. 1951, p. 644-646.

A neutron-activation method is described for the determination of Ta in mixtures containing Cb, Zr, Fe, Sn, Ti, and Si. The method depends on pile irradiation of the sample followed by measurement of the filtered γ-ray activity.

1434* Vibrating Electrodes in Amperometric Titrations. Part I. The Determination of Thiosulphate, Iodine and Tervalent Arsenic. Part II. Bromometric Determinations of Antimony and Arsenic. E. D. Harris and A. J. Lindsey. *Analyst*, v. 76, Nov. 1951, p. 647-652.

13 references.

1435* The Estimation of Oxygen in Titanium by Chlorination. J. A. Corbett. *Analyst*, v. 76, Nov. 1951, p. 652-657.

An examination was made of the chlorination technique for the estimation of oxygen in Ti metal. Data are tabulated.

1436 Aromatic Molecular Weight Distribution and Total Aromatic Content. H. E. Lumpkin and B. W. Thomas. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1738-1740.

A mass-spectrometric procedure is presented which requires 45-60 min. and has an accuracy of about ±1% for the different aromatic molecular-weight groups and for total aromatic content of motor gasoline. 12 ref.

15. *Analysis—Chemical and Physical*

1437 Two Techniques in Paper Chromatography; Application to Ketosteroids. David M. Tennent, John B. Whitla, and Klaus Florey. *Analytical Chemistry*, v. 23, Dec. 24, 1951, p. 1748-1749.

Presents the above. The first is a means of locating and measuring the amounts of the different components on chromatograms without chemical treatment, provided these components absorb either visible light or ultraviolet; and the second is a simple and convenient method for running paper strips with ascending solvent flow. 22 ref.

1438 Dielectric Constant Measurement for Continuous Determination of Toluene. B. W. Thomas, F. J. Faegin, and G. W. Wilson. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1750-1754.

Apparatus is described whereby the toluene content of a refinery stream can be monitored rapidly and recorded accurately on a continuous basis. Application of this development to refinery streams for continuous measurement of toluene and/or xylene contents was highly satisfactory. Diagrams and tables. 11 ref.

1439 Determination of Small Concentrations of Carbonyl Compounds by a Differential pH Method. Harry R. Roe and John Mitchell, Jr. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1758-1760.

The method developed involves measurement of the pH of 0.5 N aqueous hydroxylamine hydrochloride before and after addition of the sample. Graphs and tables.

1440 Estimation of Oxygen Consuming Value of Coke-Plant Aqueous Wastes. Joseph A. Shaw. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1764-1767.

Describes a procedure for the above which can be completed in 10-12 min. for a single determination. Procedure uses chromic acid solution at 100°C. as the oxidant. Data are tabulated.

1441 Study of Saponification Reaction Rate of Ethyl Acetate by High Frequency Titrimetry. F. W. Jensen, G. M. Watson, and J. B. Beckham. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1770-1773.

The possibilities of following the rate of saponification reactions with a high-frequency titrator were investigated. A method of study of saponification reaction rates is described which uses simple equipment, and no internal indicators or electrodes. With further investigation, it should prove useful for studies of reaction rate. 16 ref.

1442 Determination of Thiols in Hydrocarbon Gases. Edgar W. Ellis and Thomas Barker. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1777-1779.

A method was developed which makes use of reagents that require very infrequent restandardization, if at all. The method involves oxidation of thiols in a measured volume of gas with excess cupric acetate-acetic acid reagent and back-titration of the excess cupric ion with sodium thiosulfate in the presence of potassium iodide and starch. It is applicable to natural gas, liquefied petroleum gas, and refinery gas streams containing only butane and lighter hydrocarbons.

1443 Sensitive 4-Aminoantipyrine Method for Phenolic Compounds. M. B. Ettinger, C. C. Ruchhoft, and R. J. Lishka. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1783-1788.

In the above, variables such as pH, temperature, reagent concentration, and order of reagent addition were evaluated to permit selection of the most advantageous technique. Procedures suitable for the examination of polluted surface waters and industrial wastes are suggested.

1444 Determination of Phenols in Aqueous Wastes From Coke Plants. Joseph A. Shaw. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1788-1792.

The method here described is a combination of the bromine turbidimetric method described by Shaw and a procedure using 4-aminoantipyrine, which was originally suggested and studied by Emerson for the determination of phenol.

1445 Controlled Potential Electrolytic Separation and Determination of Copper, Bismuth, Lead, and Tin. James J. Lingane and Stanley L. Jones. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1798-1806.

Presents results of an investigation on the above. The influences of such important variables as pH, total tartrate concentration, temperature, and cathode potential have been investigated. All 4 metals may be determined without any intermediate treatment of the solution, except acidification for the determination of tin, in a total elapsed time of about 4 hours.

1446 Rapid Photometric Determination of Aluminum in Zinc and Steel. Luther C. Ikenberry and Arba Thomas. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1806-1809.

A simple photometric method was developed based on the raction of Al with eriochromecyanin R to form a violet-red colored complex. Its reproducibility is at least equal to that obtained with the gravimetric method. 11 ref.

1447 Colorimetric Determination of Boron in Aluminum With 1,1-Dianthrimide. Dwaine A. Brewster. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1809-1811.

A colorimetric procedure was developed that utilizes 1,1-dianthrimide as the color-forming reagent. Accuracy and precision were found to be excellent when tested on several representative Al alloys. Results compare favorably with values obtained by the mannite titration procedure and quantitative spectrographic analysis.

1448 Colorimetric Determination of Niobium With Thiocyanate. Harry Freund and Arnold E. Levitt. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1813-1816.

Describes a homogeneous colorimetric method based on the yellow color of a columbium thiocyanate complex. The color system is stabilized by using high concentrations of acid, chloride, thiocyanate, and miscible solvent. The absorbency of the complex follows the Beer-Lambert law in the concentration range up to 3.5 micrograms of Cb per ml. Interferences and means of minimizing them are discussed.

1449 Spectrographic Analyses of Cracking Catalysts; Determination of Magnesium and Zirconium. Leon W. Gamble. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1817-1820.

On the basis of boiling point and excitation potential, Mo and Cu were investigated as to suitability for use as internal standards in the above. Data are tabulated. 20 ref.

1450 Spectrographic Determination of Lubricating Oil Additives. J. P. Pagliassotti and F. W. Porsche. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1820-1823.

A spectrographic method was developed for direct and rapid determination of P, Ba, Ca, and Zn in lubricating oils; and in additive concentrates for P. Important features of the method include use of the magnesium salt of 2-ethylhexoic acid as a spectrochemical buffer and of Ni as an internal standard.

1451 Spectrochemical Analysis of Lithium. Louis E. Owen and Janus Y. Ellenburg. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1823-1825.

Corrosion studies involving molten Li metal and ferrous alloys made necessary the development of an analytical procedure for determination of metallic impurities. Describes this technique which has permitted quantitative study of corrosion rates not only of Li but also of other alkali metals and alkali metal hydroxides.

1452 Enzymatic Determination of Organic Phosphorus Insecticides. Paul A. Giang and S. A. Hall. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1830-1834.

Describes a highly sensitive method for determination of insecticides that inhibit cholinesterase. Although the method is generally nonspecific, one can distinguish between certain of the organic phosphorus insecticides that have large differences in inhibitory power.

1453 Determination of Dithiocarbamates. D. G. Clarke, Harry Baum, E. L. Stanley, and W. F. Hester. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1842-1846.

Describes macroprocedure based on acid decomposition, scrubbing the evolved CS_2 with lead acetate, absorbing in alcoholic KOH, and titrating with iodine. This procedure is also applicable on a semimicro scale. A microprocedure is based on colorimetric determination of evolved CS_2 as cupric dimethyldithiocarbamate.

1454 Determination of Dithiocarbamate Residues on Food Crops. W. K. Lowen. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1846-1850.

A modification of the conventional Dickinson-Viles technique for determination of dithiocarbamates in micro quantities was employed for determination of residues on a variety of fruits and vegetables. Recoveries of 75-100% of theoretical were obtained with two compounds.

1455 Polarographic Determination of Iodine in Water, Soil, and Plant Material. P. R. Godfrey, H. E. Parker, and F. W. Quackenbush. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1850-1853.

Describes the above materials. Those with high inorganic matter were subjected to dry combustion, while those low in organic matter were oxidized in a CrO_3-H_2SO_4 solution. The iodine was separated by distillation and oxidized with ozone. The amount of iodate present was then determined polarographically.

1456 Indirect Colorimetric Micro-Oxidimetry of Organic Compounds. H. T. Gordon. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1853-1858.

The methods described are applicable to a great variety of organic compounds, in trace amounts (1-10 micrograms) and dilute solutions (0.001%). The analytical reaction is a stoichiometric oxidation with an excess of Br, hypochlorite, permanganate, or ceric sulfate; the excess oxidant is then measured colorimetrically by reaction with an oxidizable dye. 10 ref.

1457 Polarographic Determination of Sulfate. A. D. Horton and P. F. Thomason. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1859-1860.

The above method depends on the reduction of the sulfate to H_2S, which is precipitated as CdS. This precipitate is dissolved in HCl, and the Cd is estimated polarographically. Sulfate is calculated from the total Cd.

1458 Photometric Determination of Traces of Silver. E. B. Sandell and J. J. Neumayer. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1863-1865.

Trace quantities of Ag can be isolated by precipitation with $SnCl_2$ from HCl, with Te as collector; and determined photometrically with p-diethylaminobenzylidene rhodanine as reagent.

1459 Modification of Schechter Method of Estimating DDT Residue. George Downing and L. B. Norton. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1870-1871.

Describes the above. Use of benzene in place of ether is discussed.

1460 Spectrophotometric Characteristics of Determination of Titanium With Thymol. John V. Griel and Rex J. Robinson. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1871-1872.

Discusses factors affecting the above. 14 ref.

1461 Dithizone as an Indicator in Titrimetric Determination of Zinc With Ferrocyanide. J. P. Mehlig and A. P. Guill. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1876-1877.

Establishes conditions for use of the above. 10 ref.

1462 Microdetermination of Carbon Dioxide Liberated by Acidification or Oxidation. David Seligson and Harriet Seligson. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1877-1878.

The above can be used for free CO_2, carbonates, or CO_2 liberated by stoichiometric oxidations. Data are tabulated.

1463 Detection and Estimation of Free and Combined Chlorine Residuals. Isodore Nusbaum and Peter Skupeko. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1881-1882.

The cyanogen halide method for the determination of microquantities of cyanide in sewage by extraction with butyl or amyl alcohol was adapted to indicate free and combined Cl, with good accuracy and reproducibility of results.

1464 Polarographic Determination of Nickel and Zinc in Copper-Base Alloys. W. E. Allsopp and Theodore E. Arthur. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1883-1884.

Discusses feasibility of the above.

1465* Flame Photometric Sodium Determination in Mixed Fertilizer Made From Ground Basic Slag and Potash Salts. (In German.) Erich Piper and Heinz Hagedorn. *Archiv für das Eisenhüttenwesen*, v. 22, Sept.-Oct. 1951, p. 299-301.

Describes apparatus for the above. The principle of measurement and the wiring are indicated; chemical and spectrographic principles of the tests are discussed. Data are tabulated and charted. Flow diagrams.

1466* Determination of Uranium in Ores. Review of Chemical Methods. F. T. Rabbitts. **Cellulose Column Method. Fluorophotometric Method.** J. B. Zimmerman. *Canadian Mining and Metallurgical Bulletin*, v. 45, Jan. 1952, p. 27-39; *Transactions of the Canadian Institute of Mining and Metallurgy*, v. 55, 1952, p. 26-38.

In the first section, 4 chemical methods are outlined. The other 2 methods are described in more extensive detail. Diagrams, tables, graphs, and illustrations.

1467 Some New Analytical Indicators. *Chemical Age*, v. 65, Dec. 8, 1951, p. 757-762. (Based on paper by W. I. Stephen.)

Describes and evaluates the above.

1468 Separations by Partition Chromatography on Paper. I. Strontium From Barium, Calcium, and Magnesium. II. Potassium, Rubidium, and Caesium. III. Sodium and Lithium. Christina C. Miller and Robert J. Magee. *Journal of the Chemical Society*, Nov. 1951, p. 3183-3187.

1469 Notes on a Modified Kjeldahl Apparatus. K. A. Hyde. *Chemistry & Industry*, Dec. 15, 1951, p. 1103.

Describes the above designed for use in a small laboratory where a limited number of protein determinations are carried out.

1470* Polarographic Irreversibility in Decelerated Electrode Processes. (In German.) A. Tockstein. *Collection of Czechoslovak Chemical Communications*, v. 16, no. 2, 1951, p. 101-112.

Proves mathematically the validity of Nernst's equation on above; and describes a special electrolytic vessel and its use in the preparation and study of numerous cases of inorganic redox systems. Several cases of retarded electrode reaction were used to test validity of the derived equation. Includes graphs and diagrams.

1471* Titrations in Nonaqueous Solutions. V. Further Oxidimetric Titrations in Glacial Acetic Acid. (In English.) O. Tomicek and J. Valcha. *Collection of Czechoslovak Chemical Communications*, v. 16, no. 2, 1951, p. 113-126.

The following were used as oxidizing agents: bromine, iodine, iodine monobromide, iodine monochloride, and lead tetraacetate. Iodine and iodine monobromine were found to be unsuitable for the present purpose. Iodine monochloride is somewhat unstable in glacial acetic acid solution but it may nevertheless be used for the potentiometric titration of a number of organic compounds. The relationship between the redox potential of lead tetraacetate and total acetate and perchloric acid concentration was studied. Volumetric solutions of lead tetraacetate were used for direct titrations of organic compounds, as well as for indirect estimations based on back-titration with hydroquinone.

1472* Tantalum and Columbium Electrodes. (In German.) L. Jensovsky. *Collection of Czechoslovak Chemical Communications*, v. 16, no. 2, 1951, p. 127-138.

Describes experiments made to determine properties of above, for use in polarography and shows that a Ta electrode can be used for indicating purposes. Behavior of the Cb electrode was found to be similar. Includes graphs and diagrams. 22 ref.

1473* Use of Complexones in Chemical Analysis. XVa. The Amperometric Determination of Bismuth and Certain Other Metals. (In English.) R. Pribil and B. Matyska. *Collection of Czechoslovak Chemical Communications*, v. 16, no. 2, 1951, p. 139-150.

1474 Polaritan Reagents. *Industrial Chemist and Chemical Manufacturer*, v. 27, Dec. 1951, p. 554.

Outlines the basis of tests applied to a new series of reagents for polarographic analysis which has recently become available on the market.

15. *Analysis—Chemical and Physical*

1475 Analysis for Industry. R. Belcher and R. Goulden. *Industrial Chemist and Chemical Manufacturer*, v. 27, Dec. 1951, p. 560-562.

Concludes the study of methods applicable for the determination of C, H, and F in organic compounds containing fluorine. 29 ref.

1476 Polarography in Concentrated Sulphuric Acid. J. C. James. *Transactions of the Faraday Society*, v. 47, Nov. 1951, p. 1240-1246.

An investigation was made of the properties of concentrated H_2SO_4 as a polarographic solvent. It is shown that a number of organic substances give polarographic reduction waves in this medium. The effect of substituents upon the ease of such reduction is discussed.

1477* Analysis of the Burned Gases Produced by Oil Furnaces During the Melting of Copper Alloys. (In French.) *Fonderie*, Nov. 1951, p. 2696-2703.

Describes various chemical and physical methods for the above. Data are tabulated.

1478* The Determination of SO_2 and SO_3 in Flue Gases. P. F. Corbett. *Journal of the Institute of Fuel*, v. 24, Nov. 1951, p. 247-251.

Reviews underlying principles of an analytical method for estimation of small traces of SO_3 in the presence of a considerable excess of SO_2. Initial attempts to reveal a correlation between the SO_3 concentration and dew-point temperature of flue gases have been encouraging. 15 ref.

1479 Estimation of Impurities in Aluminum Alloys by Means of Arc Spectra. J. Janiec. *Journal of Applied Chemistry*, v. 1, Nov. 1951, p. 482-488.

Describes and discusses spectroscopic method for the accurate estimation of Pb, Sn, Zn, and Ni in Al. Results are tabulated.

1480* Determining Absorbed Water by Exchange With Deuterium Oxide. Extension of the Exchange Method to the Study of Macromolecular Structures. (In French.) Rodolphe Viallard. *Journal de Chimie Physico-Chimie Biologique*, v. 48, July-Aug. 1951, p. 372.

Presents a brief discussion of the above.

1481 Photometric Determination of Copper in Iron and Steel With Diethyldithiocarbamate. John L. Hague, Eric D. Brown, and Harry A. Bright. *Journal of Research of the National Bureau of Standards*, v. 47, Nov. 1951, p. 380-384.

Describes above procedure. Typical data are tabulated and charted. 13 ref.

1482* Industrial Petroleum Chromatography. Part III. 1927-1934: The Coming of Silica Gel. Herbert Weil. *Petroleum*, v. 15, Jan. 1952, p. 9-12, 28.

Surveys the origins of silica gel and the properties which made this material so useful in petroleum chromatographic fractionation. A short critique of adsorption engineering as applied in percolation applications is also given. Some chromatographic fractionations of hydrocarbon mixtures are reviewed as typical of the period and the first separation of a coal-tar solution is described. 107 ref. (To be continued.)

1483 A Manual Instrument for Rapid Precision Polarography. James I. Watters. *Review of Scientific Instruments*, v. 22, Nov. 1951, p. 851-853.

Describes the above giving diagrams.

1484* Determination of Phenols by the Amino-Antipyrine Method. Michael Dannis. *Sewage and Industrial Wastes*, v. 23, Dec. 1951, p. 1516-1522.

Shows that the above is applicable to the determination of phenol in coke-plant wastes. Indicates that the method may be used on other types of phenol-containing wastes.

1485* Determination of Calcium and Magnesium in Soil and Plant Material. Kuang Lu Cheng and Roger H. Bray. *Soil Science*, v. 72, Dec. 1951, p. 449-458.

Procedures for determining Ca and Mg in soil extracts and solutions of digested plant material by versenate titrations are described. Versenate is a complex-forming organic reagent known also as a "Complexone." 13 ref.

1486* Application of Ultraviolet Rays in Chromatography. (In Russian.) E. M. Brunberg. *Uspekhi Fizicheskikh Nauk*, v. 43, Apr. 1951, p. 600-619.

Reviews the above. Includes diagrams and graphs. 23 ref.

1487* Detection of Arsenic in Germanium Dioxide. (In German.) G. Brauer and H. Renner. *Fresenius' Zeitschrift für analytische Chemie*, v. 134, no. 1, 1951, p. 9-17.

Several methods for the above were investigated. The Bettendorf method was found to be generally applicable and simplest to perform. Data are tabulated.

1488* Contribution to the Analytical Determination of Different Phosphates in Their Mixtures. I. W. Dewals and H. Schmidt. (In German.) *Fresenius' Zeitschrift für analytische Chemie*, v. 134, no. 1, 1951, p. 17-22.

Includes improvement of the Britske-Dragunow pyrophosphate determination; and determination of pyrophosphate and trimetaphosphate in their mixtures. Typical data are tabulated and charted.

1489* Ascorbiometric Determination of Iodate and Iodide. (In German.) Ladislaus Erdey, Andreas Bodor, and Helene Buzás. *Fresenius' Zeitschrift für analytische Chemie*, v. 134, no. 1, 1951, p. 22-32.

Description of procedure in which ascorbic acid is used includes graphed and tabulated data.

1490* Calorimetric Microdetermination of Germanium. Ladislaus Erdey and Andreas Bodor. *Fresenius' Zeitschrift für analytische Chemie*, v. 134, no, 2, 1951, p. 81-86.

Description of above procedure includes tabulated and charted data. Ascorbic acid is the reagent used.

1491* Contribution to the Analytical Determination of Different Phosphates in Their Mixtures. II. The Determination of Pyrophosphate and High-Polymeric Metaphosphate in Their Mixtures. W. Dewald and H. Schmidt. *Fresenius' Zeitschrift für analytische Chemie*, v. 134, no. 2, 1951, p. 86-95.

1492* Determination of Tellurium and Its Separation From Selenium by Means of Tetraphenylarsonium Chloride. Helmut Bode. *Fresenius' Zeitschrift für analytische Chemie*, v. 134, no. 2, 1951, p. 100-106.

Describes procedure for determining Te gravimetrically or titrimetrically and shows that Se can be quantitatively determined in the filtrate or the Te precipitate. Tables and references.

1493* Qualitative Identification of Germanium With the Aid of Tannin. (In German.) G. Brauer and H. Renner. *Fresenius' Zeitschrift für analytische Chemie*, v. 133, no. 6, 1951, p. 401-412.

Description of above constitutes a method that is simpler and more reliable than earlier methods. Results are graphed and tabulated. 14 ref.

1494* Separating Iodine From the Alkali and Alkaline-Earth Halides With the Aid of Activated Carbon. (In German.) B. Stempel. *Fresenius' Zeitschrift für analytische Chemie*, v. 133, no. 6, 1951, p. 412-414.

Procedure of above is briefly described and results are tabulated.

1495* "Complete Analysis" of Iron and Steel. (In German.) R. Kraus. *Fresenius' Zeitschrift für analytische Chemie*, v. 133, no. 6, 1951, p. 414-428.

Describes methods for analyzing pig iron, cast iron, malleable iron, unalloyed steel, and cast steel. Data are graphed and tabulated. 12 ref.

1496* Drop Reaction on Cobalt With the Aid of Dimethylaminoantipyrine. V. P. Zhivopistsev. *Zhurnal Obshchei Khimii*, v. 21(83), Mar. 1951, p. 481-485.

Qualitative analysis of cobalt in the presence of various other elements was investigated experimentally. Results are discussed and tabulated.

Miscellaneous Publications

1497 Qualitative Analysis of Alloy Steels; Detection of Vanadium, Tungsten, Molybdenum, Chromium, and Man-

ganese. C. Beermann and H. Hartmann. Henry Brutcher, Translation 2770. 6 pages. (From *Archiv für das Eisenhüttenwesen*, v. 22, nos. 5-6, 1951, p. 159.)

Describes method whereby small quantities of V in special steels can be detected in a simple manner. In addition, Mn, Cr, Mo, and W can be detected by spot tests. Interferences are eliminated by suitable modifications of the method.

Books

1498 Ultraviolet Spectra of Aromatic Compounds. Robert A. Friedel and Milton Orchin. 52 pages plus 579 spectrograms. 1951. John Wiley & Sons, New York. (QC437 F91u)

Presents spectrograms of 579 organic compounds. Discusses theoretical aspects as well as their use in analysis.

See also:
1115 (determining O_2 in steel)
1581 (handbook of colorimetry)
2053 (determination of Cu and Zn in soils or plants)
2188 (radioactive current source in analysis)

16. APPARATUS, METHODS, AND STANDARDS

1499* Optical Demonstration of Electron-Diffraction Effects Due to Small Particle Size. (In English.) W. G. Burgers. *Acta Crystallographica*, v. 4, Nov. 1951, p. 502-503.

Above is presented for ZnO.

1500* X-Ray Scattering by Aggregates of Bonded Atoms. I. Analytical Approximations in Single-Atom Scattering. (In English.) R. McWeeny. *Acta Crystallographica*, v. 4, Nov. 1951, p. 513-519.

An approach is made to the problem of calculating atomic scattering factors for real atoms in which both inherent departures from sphericity and effects of bonding are taken into account. Analytical approximations to atomic wave functions are used in order to obtain closed expressions for the scattering factors of the atoms hydrogen to neon.

1501* A New Approach to Crystal-Structure Analysis. (In English.) M. J. Buerger. *Acta Crystallographica*, v. 4, Nov. 1951, p. 531-544.

Vector-set methods are applied to the solution of Patterson syntheses. The relation between these methods and those of Clastre and Gay, Garrido, Robertson, and McLachlan is briefly discussed.

1502* The Determination of Interplanar Spacings and Cell Dimensions From Powder Photographs Using an Internal Standard. (In English.) K. W. Andrews. *Acta Crystallographica*, v. 4, Nov. 1951, p. 562-563.

Typical data are charted.

1503* Electronic Flash Photography. R. L. Aspden. *Aircraft Engineering*, v. 23, Dec. 1951, p. 354-360.

Describes applications in the development, instrumentation, and operation of aircraft. Circuit diagrams and illustrations.

1504 A Comparison of Pore Size Distributions of Activated Carbons Calculated From Nitrogen and Water Desorption Isotherms. A. J. Juhola, A. J. Palumbo, and S. B. Smith. *Journal of the American Chemical Society*, v. 74, Jan. 5, 1952, p. 61-64.

In the above, a comparison was made between 2 methods of computing pore-size distributions as applied to activated carbons. Since both methods (although based on considerably different adsorption theories) should give the same pore size distribution for a given carbon, the agreement or disagreement serves to confirm the validity, and/or to indicate the weaknesses of the methods.

1505 Intensities and Shapes of Infrared Absorption Bands of Substances in the Liquid Phase. D. A. Ramsay. *Journal of the American Chemical Society*, v. 74, Jan. 5, 1952, p. 72-80.

Presents results of an investigation made to establish convenient methods for the accurate evaluation of infrared band intensities. The application to the specific problem of the steroid carbonyl bands is discussed. 39 ref.

1506 Electronics at Work. John Starr. *American Machinist*, v. 95, Dec. 24, 1951, p. 102-104.

Presents a brief survey of electronic methods in metalworking production jobs, including spot welders, riveters, induction heaters, machine-tool controls, etc.

1507* Two New Economical Computers for the Design and Analysis of Servomechanisms, Networks, Amplifiers, and Analogous Dynamical Systems. Donald Herr. *Journal of the American Society of Naval Engineers*, v. 63, Nov. 1951, p. 851-872.

The first computer presented is a modern version of the algebraic-equation solver earlier described. The second is a mechanization of the "locus-of-roots" method analysis and design previously explained by W. R. Evans. Each of these computers uses two new computer components. One is a high-precision, universal-frequency a.c. induction resolver, the other is an a.c. induction potentiometer. Discusses the mathematical and physical fundamentals of the systems. 15 ref.

1508* Recent Work on Metering of Flow. (In German.) R. Witte. *Brennstoff-Wärme-Kraft*, v. 3, Nov. 1951, p. 378-380.

Brief review of different methods includes graphs and tables. 19 ref.

1509 Shadow-Casting With Halides in the Electron Microscope. William H. Barnes and Margaret S. Lambe. *Canadian Journal of Physics*, v. 29, Nov. 1951, p. 491-494.

Experiments on the behavior of halides as shadow-casting agents in electron microscopy are described. The use of CaF_2, placed directly on the specimen screen, is suggested as a convenient method for routine qualitative shadowing of preparations in the preliminary stages of an electron-microscopic study. No vacuum-coating equipment is required.

1510* Comparative Results of Optical Measurements. (In French.) G. Ribaud, M. M. Michaud, M. M. Rivière, and M. J. Galey. *Chaleur & Industrie*, v. 32, Nov. 1951, p. 301-310.

Presents in detail experiments on the measurement of temperatures of monocromatic brilliance of flames and of furnace refractories using a photoelectric cell. Effects of fuel type are described. Includes a comprehensive table of results; charts and diagrams.

1511 A New All-Glass Membrane Manometer. A. Kabesh and R. S. Nyholm. *Journal of the Chemical Society*, Nov. 1951, p. 3252-3253.

Describes and diagrams the above, useful in pressure measurements involving substances capable of attacking mercury all-glass manometers.

1512* Highly Sensitive, Temperature-Compensated Hydrometer for Industry and Laboratory. (In German.) R. Neubauer. *Chemie-Ingenieur-Technik*, v. 23, Oct. 28, 1951, p. 502-503.

Describes a new hydrometer in which temperature changes are compensated by a float which uses or falls inversely with the temperature. Includes diagrams and graphs.

1513* The Electron Microscope and Its Industrial Applications. J. W. Sharpe. *Chemistry & Industry*, Nov. 17, 1951, p. 976-981.

Surveys the above. Uses in metallurgical studies, chemical research, industrial dust studies, rubber manufacture, and pigment and paint studies are given as a few examples. Illustrations. 12 ref.

1514 A Magnetic Fluid Dynamometer. D. W. Brede. *Electrical Engineering*, v. 71, Jan. 1952, p. 50. (A condensation; to be published in *AIEE Transactions*, v. 70, 1951.)

Briefly describes development of the above. Torque vs. exciting-current characteristic of the dynamometer is charted.

1515 Servo Characteristics of a Rectifier-Driven Motor. L. D. Harris. *Electrical Engineering*, v. 71, Jan. 1952, p. 76. (A condensation; to be published in *AIEE Transactions*, v. 70, 1951.)

Mathematical analysis.

16. *Apparatus, Methods, and Standards*

1516* Transient Phenomena Studies Made Easier. W. T. Morris and B. M. Gallaher. *Electrical World*, v. 137, Jan. 14, 1952, p. 94-95.

Describes a direct writing oscillograph that fills gap between recording voltmeter-ammeter and photographic oscillograph methods. Uses to which it can be put seem unlimited.

1517 Tomato Classification by Spectrophotometry. Traver J. Smith and Richard A. Huggins. *Electronics*, v. 25, Jan. 1952, p. 92-94.

To eliminate human element in judgment of color, a bridge spectrophotometer measures ratio of reflectance at two critical points. Technique is applicable to grading other agricultural products by use of appropriate points on spectral reflectance curves. Diagrams of physical set-up are given.

1518 Super-Speed Tape Puller for Computer Memory. *Electronics*, v. 25, Jan. 1952, p. 222, 224.

Tells how high-speed starting, stopping and reversing with notable mechanical simplicity are features of a new magnetic-tape-handling machine recently developed at the National Bureau of Standards for use with the SEAC computer.

1519* A Steel Plate Thickness Meter. S. S. Carlisle and B. O. Smith. *Engineer*, v. 192, Dec. 21, 1951, p. 805-808.

Describes a portable instrument for measurement of the thickness of steel plates requiring access to one side of the plate only. It employs a magnetic method. Also briefly describes the resistance, ultrasonic, and other magnetic methods of measuring the thickness of metal plates from one side only and points out the advantages of the magnetic method adopted. Graphs and diagrams.

1520* How to Build a "Hot Lab." *Engineering News-Record*, v. 147, Dec. 20, 1951, p. 30-33.

Gives information for design and construction of a radioisotope laboratory.

1521 Office Robots. *Fortune*, Jan. 1952, p. 82-87, 112, 114, 117-118.

Surveys trends in electronic-computer development. Describes the essential functioning of the computer unit.

1522 Servomechanisms. Harold Chestnut and Robert W. Mayer. *General Electric Review*, v. 54, Dec. 1951, p. 39-46.

Discusses factors of stability and accuracy in automatic control systems, and the development of means of solving related engineering problems. 50 ref.

1523 Statistical Methods in the Chemical Industry. Part I. O. L. Davies. *Industrial Chemist and Chemical Manufacturer*, v. 27, Dec. 1951, p. 541-544.

Presents a discussion of basic concepts and their application to the interpretation of data. (To be continued.)

1524* New Hardness and Wear Testers. *Industrial Diamond Review*, new ser., v. 11, Dec. 1951, p. 261-263.

Describes new apparatus for testing shear and scratch hardness, cutting resistance and machinability of metals. Also, includes apparatus for testing rubber, plastics, leather, paint, stone, and ceramics.

1525* Some Aspects of Electrical Instrument Design. L. Hartshorn. *Proceedings of the Institution of Electrical Engineers*, v. 98, pt. 2, Dec. 1951, p. 657-664.

A detailed presentation on the quality of modern instrument design. Covers accuracy and precision limits of performance, significant developments, electrostatic techniques, and instrument finish.

1526* Performance Limits in Electrical Instruments. A. H. M. Arnold. *Proceedings of the Institution of Electrical Engineers*, v. 98, pt. 2, Dec. 1951, p. 701-710; disc., 710-713.

Describes the defects found in instruments submitted for test by the National Physical Laboratory. Some of the most important of these are scale errors, level errors, and sticking of the movement. The frequency errors of a number of types of instruments are considered, and improvements made possible by simple types of compensation are demonstrated.

1527* Components for Instruments. R. E. Hall and E. Coop. *Proceedings of the Institution of Electrical Engineers*, v. 98, pt. 2, Dec. 1951, p. 738-752; disc. 753-758.

Describes the present position regarding some components used in electrical instruments from the aspect of reliability and functional suitability under severe working conditions. 21 ref.

1528* Radiation Measuring Instruments for X-Rays to Cosmic Rays. D. Taylor. *Proceedings of the Institution of Electrical Engineers*, v. 98, pt. 2, Dec. 1951, p. 760-770.

A review of the techniques used in the detection and measurement of very-short-wave radiations and nuclear and cosmic particles. Covers X-rays and γ-rays, charged particles, and uncharged particles. 22 ref.

1529* Radiation Measuring Instruments for the Infra-Red to Ultra-Violet Waveband. A. C. Menzies. *Proceedings of the Institution of Electrical Engineers*, v. 98, pt. 2, Dec. 1951, p. 771-780.

Discusses design of the above. Infrared techniques are considered in some detail. Typical electrical methods of emission and absorption spectroscopy in the visible and ultraviolet regions are described, and a new type of photoconductive cell for this part of the spectrum is mentioned. 33 ref.

1530* Servomechanism Techniques In Modern System Engineering. G. M. Muschamp. *Instrumentation*, v. 5, 4th qtr., 1951, p. 4-6.

Discusses the above. Includes origin of servomechanism approach, techniques in applications, and advantages offered. Diagrams of typical systems are given.

1531 Application of Dielectric Measurement to Continuous Processes. Wilfred H. Howe. *Instruments*, v. 24, Dec. 1951, p. 1434-1438, 1484, 1486; disc., p. 1486, 1488, 1490.

Covers principles and applications of the technique, including primary elements and electric circuit for capacity measurement of solids, liquids, and gases.

1532 Electronic Timers. E. A. Demonet and L. C. Bower. *Instruments*, v. 24, Dec. 1951, p. 1439-1441, 1474.

Basic circuits and operation of typical timers which use both hot-cathode high-vacuum tubes and cold-cathode gas tubes are described. Curves permit rapid selection of RC values for any desired timing operation with a given gas tube.

1533 Instrument Electronics. V. Vacuum Tubes. Milton H. Aronson. *Instruments*, v. 24, Dec. 1951, p. 1442-1445, 1478-1484.

Describes the diode, triode, tetrode, pentode, beam-power pentode, variable-mu tube, cathode-ray tube, and special uhf. tubes used commonly in instrument circuits. Includes schematic diagrams and test questions at the end of the article.

1534 The Control Valve in Operation. Wilmot H. Kidd and George A. Philbrick. *Instruments*, v. 24, Dec. 1951, p. 1494-1502; *I.S.A. Journal*, v. 7, Dec. 1951, p. 136-144.

Importance of the control valve in the control circuit is shown. Emphasis is on the final flow-stroke relationship, which is shown to be noticeably affected by pressure drop in line and equipment. The ideal of equivalent orifices in a large line allow a presentation, by graphical means, of relationships among valves, instruments, and line of flow. Schematic diagrams and graphs. 14 ref.

1535 The Binac. A. A. Auerbach, J. P. Eckert, Jr., R. F. Shaw, J. R. Weiner, and L. D. Wilson. *Proceedings of the I.R.E.*, v. 40, Jan. 1952, p. 12-29.

Describes the Binac, the first high-speed electronic digital computer of its type to be completed. It consists of a main computing section, input-output equipment, and a mercury delay-line memory of 512-word capacity. Although designed for a specific purpose, the Binac is well adapted to any type of general mathematical computation. Diagrams.

1536 Logical Description of Some Digital-Computer Adders and Counters. Harry J. Gray, Jr. *Proceedings of the I.R.E.*, v. 40, Jan. 1952, p. 29-33.

A number of adding and counting circuits which have a high degree of reliability are described. Most of them have been

used in digital computers. A high-speed binary counter is described which can be cycled either forwards or backwards. Diagrams.

1537 Steel Specifications. Norman E. Woldman. *Iron Age*, v. 169, Jan. 3, 1952, p. 260, 262, 266, 270, 272, 276, 278, 280, 282-283, 286, 288, 290, 294, 296, 298-300, 302, 304-306, 308, 312, 314, 318, 320, 322, 324, 326, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 518, 520.

A brief analysis of various civilian, federal and military specifications designed to aid defense contractors. Lists the composition and form of the material referred to in these specifications and notes whether or not it is similar to a better known standard specification.

1538 Experimental Survey of Low-Load Hardness Testing Instruments. A. R. G. Brown and E. Ineson. *Journal of the Iron and Steel Institute*, v. 169, Dec. 1951, p. 376-388.

Reviews the literature, describes available low-load hardness testers, and gives the method of operation used. Discusses sources of error in hardness determinations. Results are discussed and tabulated. 48 ref.

1539 The Transmission of Light Through Suspensions. G. F. Lothian and F. P. Chappel. *Journal of Applied Chemistry*, v. 1, Nov. 1951, p. 475-482.

Discusses above method for determining particle size. Reviews values of K as a function of wavelength of incident light; index, absorption, and radius of the particles; and angular size of the detector used in an experimental arrangement. Attention is confined to spherical particles. Some typical results from published calculations are quoted and reviewed, and optimum conditions for measurement are suggested. 21 ref.

1540 Plastic-Wave Propagation Effects in High-Speed Testing. E. H. Lee and H. Wolf. *Journal of Applied Mechanics*, v. 18, *(Transactions of the American Society of Mechanical Engineers*, v. 73), Dec. 1951, p. 379-386.

A material test carried out at high speed may be markedly influenced by plastic-wave propagation effects. In such a case, variation of strain occurs along the test specimen, and the stress-strain relation cannot be determined from measurements made on the specimen as a whole. The theoretical plastic-wave analysis of a particular test arrangement is given. Range of speed is determined which permits satisfactory interpretation without need for detailed analysis of plastic-wave propagation. Application to other test arrangements is discussed.

1541* Reference Radiographs for Inspection of Aluminum and Magnesium Castings. J. J. Pierce. *Machinery* (American), v. 58, Dec. 1951, p. 157-159.

Tells how standard radiographic terminology to be used for defects in Al and Mg castings is to be illustrated in a manual prepared by the Naval Ordnance Laboratory. Test results on specimens containing defects and corresponding radiographs will be incorporated.

1542* A New, Rapid-Acting Osmometer. (In German.) H. Hellfritz. *Makromolekulare Chemie*, v. 7, Oct. 1951, p. 184-190.

Describes and diagrams instrument capable of reaching equilibrium in 2-3 hrs. The construction is very simple. It possesses neither valves or taps, hence is indifferent towards leakage. Some measurements comparing several types of osmometers are described.

1543 High Quality Nonferrous Castings Assured by Use of Radiography. Charles B. Johnson and Stanley A. Brosky. *Materials & Methods*, v. 34, Dec. 1951, p. 73-75.

Describes the use of radiographic inspection to decrease the percentage of rejects in castings. Reduces machining time and cuts material costs.

1544* Ultrasonic Detection of Internal Defects. (In French.) R. Pohlman. *Métaux: Corrosion—Industries*, v. 26, Oct. 1951, p. 410-414.

Describes an ultrasonic process in which metallic pieces are placed in a vat filled with CCl_4, $CHCl_3$, or other liquid, making it possible to detect more accurately internal ruptures of thick plates. In one operation, an area up to 500 mm. dia. can be examined. The ultrasonic rays, produced by a quartz crystal or by an ultrasonic transmitter, completely traverse the examined piece and pass through a lens which focuses the rays. The lens is capable of producing, on an image-conversion plane, an exact sonic image of perturbations and defects. Includes diagrams and illustrations.

1545* Three Laboratory Furnaces for High Temperatures. (In French.) R. L. Bickerdike. *Métaux: Corrosion—Industries*, v. 26, Oct. 1951, p. 415-421.

Describes, diagrams, and illustrates arc, tungsten-resistance, and high-frequency induction furnaces designed for research on materials at high temperatures. Illustrated. 24 ref.

1546* New Applications of the Micromachine Type MI/44. S. A. Sadamel. *Microtecnic* (English Ed.), v. 5, Sept.-Oct. 1951, p. 233-240.

Describes above machine for tensile testing of metal wires and strips and of textile threads and fibers. Tests on 18/8 stainless cold-worked wire are shown as examples.

1547* Interference Microscope for the Measurement of Surface Finish. M. Delaunay. *Microtecnic* (English Ed.), v. 5, Sept.-Oct. 1951, p. 248-250.

Describes new type of the above with illustrations.

1548* The Use of Optical Comparators in Tool and Cutter Grinding. C. W. Parnham. *Modern Machine Shop*, v. 24, Jan. 1952, p. 112-114, 116, 118, 120, 122.

Describes the above as an inspection machine capable of rapid and extremely accurate checking of parts such as screws, gear teeth, tapers and other unusual shapes which are difficult to check by mechanical means.

1549* Progress in Photographic Instrumentation in 1950. Kenneth Shaftan. *Journal of the Society of Motion Picture and Television Engineers*, v. 57, Nov. 1951, p. 443-488.

Reports briefly on the above. Includes high-speed still and motion photography, cathode-ray still oscillography, interferometry, radiography, photosensitive materials and treatment, optical sources, and various others. 299 ref.

1550 The Proportional Counter in X-Ray Work. A. R. Lang. *Nature*, v. 168, Nov. 24, 1951, p. 907-908.

Discusses the above giving advantages over the Geiger counter. A comparison is made between the proportional counter and a Geiger counter on copper $K\alpha$ radiation.

1551* Theoretical and Practical Sensitivity Limits in Fluoroscopy. D. T. O'Connor and D. Polansky. *Non-Destructive Testing*, v. 10, Fall 1951, p. 10-21.

Expressions are developed which describe the sensitivity or quality of fluoroscopic images in terms of measurable characteristics of X-ray tubes and fluoroscopic screens. Experimental data are presented in support of these expressions. The requirements imposed by adequate fluoroscopic viewing are used to specify the design features of a proposed fluoroscopic X-ray tube. A 4-fold improvement in fluoroscopic sensitivity in the inspection of Al and Mg alloys is demonstrated. 49 ref.

1552* Applications of the Triboelectric and the Thermoelectric Effects to the Sorting of Metals. Antony Doscheck. *Non-Destructive Testing*, v. 10, Fall 1951, p. 22-28.

Describes fundamental principles of the above in elementary terms. Apparatus and procedure are also described. An alloy of 90% Ni and 10% Cr has been found to be electrically "positive" to all of a very large number of various pure metals and alloys. Triboelectric reactions with various types are described.

1553* Testing Abrasive Wheels With the Sonic Comparator. R. G. Rowe. *Non-Destructive Testing*, v. 10, Fall 1951, p. 29-34.

Describes and illustrates apparatus and procedure. Presents typical results.

1554* Weldment Inspection in Aircraft Construction. John W. Sweet. *Non-Destructive Testing*, v. 10, Fall 1951, p. 34-38.

Describes and illustrates the above, especially the methods used by Boeing Airplane Co., Seattle, for both steels and light alloys.

16. *Apparatus, Methods, and Standards*

1555* Flow Metering to Save. P. A. Hyde. *Plant*, v. 5, Jan. 1952, p. 49.

Experiences of the Ohio Edison Company with rotary type shunt flow meters on supply lines from central heating system indicate the logic in knowing where, and how much, steam is being consumed. Use of demand recorder attachments have proved valuable in determining orifice-plate requirements.

1556 Dilastrain Method Speeds Research by Cutting Endurance Limit Test Time. *Product Engineering*, v. 23, Jan. 1952, p. 193.

Describes rapid and accurate method for determining the endurance limit of metals and plastics, used for moving mechanical parts such as turbine blades, aircraft propellors, drive shafts and the like, devised at Rensselaer Polytechnic Institute. This new development, called the R/S Dilastrain Method, should speed the search for new alloys and materials by sharply reducing testing time. Illustrated.

1557* Damping Capacity Measurements as an Aid to the Metallurgist. E. Linacre. *Research*, v. 4, Dec. 1951, p. 540-541.

Basic principles of the above are outlined. Possibilities of use of the technique in determination of diffusion coefficients, grain size, intensity of magnetization, and phase change on transformation are discussed.

1558 A Sensitive Differential Manometer. J. M. Los and J. A. Morrison. *Review of Scientific Instruments*, v. 22, Nov. 1951, p. 805-809.

The above is described. Mercury surfaces in two arms of the manometer form plates of condensers connected to two nearly identical oscillator circuits. A change in pressure produces a change in the beat frequency of the oscillators which is measured by comparison on an oscilloscope with the output of an audio signal generator. Diagrams. 10 ref.

1559 The Use of Film in X-Ray Diffraction Studies. M. H. VanHorn. *Review of Scientific Instruments*, v. 22, Nov. 1951, p. 809-811.

A study of the effect of change of development time has shown that the density range over which a linear density vs. exposure relation holds depends on the degree of development; and that optimum dvelopment time varies considerably for different film types. Data are graphed and tabulated.

1560 Self-Quenching Counters Containing Small Amounts of Polyatomic Constituent. A. D. Krumbein. *Review of Scientific Instruments*, v. 22, Nov. 1951, p. 821-827.

The least amount of quenching constituent required to produce self-quenching action, in counters filled with rare gas-polyatomic gas or vapor mixtures, was measured as a function of cathode radius and total pressure for methane, butane, and ethyl acetate in He, Ne, and A. Data are graphed. 15 ref.

1561 Notes on High Vacuum, High Temperature Technique in Induction Heating. G. W. Ziegler, Jr., L. E. Bollinger, R. Speiser, and H. L. Johnston. *Review of Scientific Instruments*, v. 22, Nov. 1951, p. 842-843.

The above is discussed from standpoint of thermocouple measurements and electron bombardment.

1562 A Scanning Device for Precision Determination of Lattice Parameters at Constant Temperatures. M. E. Straumanis and E. Z. Aka. *Review of Scientific Instruments*, v. 22, Nov. 1951, p. 843-844.

Lattice-parameter determinations can now be made with a precision of 0.0005% using powder or rotating-crystal methods and asymmetric film arrangement. Factors to be considered are discussed. Illustration and diagram.

1563 A Simplified Vacuum Furnace for Growing Metallic Monocrystals. John J. Gilman. *Review of Scientific Instruments*, v. 22, Nov. 1951, p. 854-855.

Describes the above, citing advantages of this type of furnace design. Schematic diagram is given.

1564 Photoconductive Cells for Detection of Infrared Radiation. O. Simpson and G. B. B. M. Sutherland. *Science*, v. 115, Jan. 4, 1952, p. 1-4.

Reviews scientific and industrial applications for the above. Gives information concerning the performance of such detectors as an aid to estimation of their capabilities. 28 ref.

1565* Statistics. Warren Weaver. *Scientific American*, v. 186, Jan. 1952, p. 60-63.

Explains, in simple terms, how statistical methods may be used for interpretation of numerical data.

1566 Immersion Pyrometry as an Aid to Smelting Practice; Results of Recent Research in the United Kingdom. *South African Mining and Engineering Journal*, v. 62, pt. 2, Dec. 8, 1951, p. 611, 613.

Reviews above work as applied to steelmaking.

1567* Quality Control and the Problem of Steel Selection From Commercial and High-Quality Steels. (In German.) Hubert Hoff. *Stahl und Eisen*, v. 71, Nov. 22, 1951, p. 1293-1304; disc., p. 1304-1310.

Quality control in an integrated steelworks is described with examples of deep-drawing and free-machining steels. Effects of type of melting or deoxidation applied, of pouring conditions, and of composition and degree of purity on workability and service performance are considered. Includes charts and macrographs. 40 ref.

1568* Instrumentation in Iron and Steel Practice With Reference to Automatic Control. W. B. Wright and J. W. Muir. *West of Scotland Iron and Steel Institute Journal*, v. 57, 1949-50, p. 125-159; disc., p. 160-166.

Deals with the principles, application, and accuracy to be expected of a number of industrial instruments used in the production of iron and steel. Subjects discussed include flow measurement, temperature measurement, CO_2 measurement, and application of automatic control. Reference is made to the various types of automatic-control action.

1569* New Methods and Devices for the Drawing Die Shop. W. Lueg. *Wire and Wire Products*, v. 26, Dec. 1951, p. 1146-1148.

Describes methods and equipment that have been found helpful in inspection of finished wire-drawing dies. Illustrations show tungsten carbide dies in different conditions. Illustrations and diagrams show working scheme of the "Alfameter" and "Zetmeter" recently developed at the Max-Planck-Institut, Düsseldorf, Germany.

1570* A Temperature Regulator for Electric Furnaces. (In German.) A Simon and R. Schrader. *Zeitschrift für anorganische und allgemeine Chemie*, v. 266, Nov. 1951, p. 208-215.

The regulator described and diagrammed is not affected by variations of barometric pressure and room temperature. It holds the temperature constant within ±1°C.

Miscellaneous Publications

1571 Some Thermal Considerations in Foundry Work. Victor Paschkis. *Transactions of the American Foundrymen's Society*, v. 59, 1951, p. 7-19. (TS200 Am35t)

Presents the impressions of a heat-transfer man regarding foundry problems. Covers heat problems in the foundry, methods of making thermal studies, and thermal studies with the heat and mass flow analyzer. 20 ref.

1572 Radiography as an Assistant to Foundry Practice. Charles B. Johnson and Stanley A. Brosky. *Transactions of the American Foundrymen's Society*, v. 59, 1951, p. 151-156; disc., p. 157-158. (TS200 Am35t)

Presents a survey on the above. Various aspects of the procedure are illustrated.

1573 Total Hemispherical Radiometers. J. T. Gier and R. V. Dunkle. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 339-343; disc., p. 343-345. (TK1 Am35tr)

Discusses characteristics required for the above. Describes some instruments satisfying the requirements. The devices were developed to measure the total irradiation, atmospheric plus solar, and can be used for both diurnal and nocturnal measurements. Diagrams.

1574 Analogue Computing Techniques Applied to Economies. R. H. Strotz, J. F. Calvert, and N. F. Morehouse.

Transactions of the American Institute of Electrical Engineers, v. 70, pt. 1, 1951, p. 557-562; disc., p. 562-563. (TK1 Am35tr)

Discusses the application of analog computors in economics. Presents a brief survey of suitable problems in theoretical economics, and discusses electrical representations in terms of present and imminent developments in analog-computing techniques.

1575 Some Design Criteria for Automatic Controls. Paul T. Nims. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 606-611. (TK1 Am35tr)

Certain theorems were developed relating, in an especially simple manner, the areas under control response curves to the Laplace transforms of these curves. Numerical values can be assigned to the areas in question and the resulting equations supply useful relationships between the parameters in a typical control design problem. 15 ref.

1576 Effects of Carrier Shifts on Derivative Networks for A-C Servomechanisms. George M. Attura. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 612-618. (TK1 Am35tr)

Discusses the above. The network output, when the circuit is driven by sinusoidal modulation, is resolved into its components, and their passage through the servomotor was studied.

1577 A Phase-Plane Approach to the Compensation of Saturating Servomechanisms. Arthur M. Hopkin. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 631-639. (TK1 Am35tr)

Describes a control means that will give optimum performance when the servomechanism motor and load have been previously specified, using the performance criterion already established. Considers methods of modifying control to follow a constant-velocity input with a minimum following error when constant-velocity output is attained. Diagrams and graphs.

1578 An Analysis of an X-Ray Absorption Method for Measurement of High Gas Temperatures. Ruth N. Weltmann and Perry W. Kuhns. National Advisory Committee for Aeronautics, Technical Note 2580, Dec. 1951, 35 pages. (TL570 Un3t)

Describes the above. At high temperatures (above 1800°K. for hydrocarbon combustion gases), dissociation affects the values of some of the parameters. For this reason, a correction factor is defined and calculated as a function of temperature (up to 3000°K.) for stoichiometric mixtures of hydrocarbons and air. Design suggestions for a practical instrument of optimum sensitivity in temperature measurement are given on the basis of a theoretical analysis, which is corroborated by a few experimental data. Graphs and tables.

1579 Study of the Ventilation Requirements for Power Reactor Compartments. William O. Passarelli, Jr. U. S. Atomic Energy Commission, AECD-3228, May 14, 1951, 41 pages. (UF767 U3a)

Deals with the problems of determining the above so that operating personnel will be protected from breathing more than a tolerable amount of radioactively contaminated air.

Books

1580 Materialprufüng nach dem magnetpulver-Verfahren. (Materials Testing by the Magnetic Powder Process.) E. A. W. Müller. 144 pages. 1951. Akademische Verlagsgesellschaft Geest und Portig K.-G., Leipzig, Germany. (TA460 M91m)

Describes principles, uses, and equipment of the various magnetic-powder methods of materials testing. Numerous illustrations, tabular data, graphs, a comprehensive bibliography, and a list of 52 German and foreign patents are included.

1581 Handbook of Colorimetry. 87 pages. 1936. Technology Press, Massachusetts Institute of Technology. (QC495 M38h)

Chapter one surveys the entire subject of colorimetry and was written primarily for the benefit of those who are approaching this subject for the first time. This is followed by a discussion of the characteristics of light sources, the physical measurements of colored materials, and the laws of color mixture. These later chapters also include many auxiliary tables and charts that facilitate the specification of color. No colored illustrations.

See also:
1099 (size reduction—review)
1170 (radiography of bronze castings)
1194 (tracer study of tool life)
1294 (single and polycrystal preparation)
1323 (magnetic materials for instruments)
1389 (inspection in steel pipe fabrication)
1640 (radiation pyrometry)
1697 (aircraft and aircraft-engine test apparatus)
1832 (instrumentation Symposium—ACS)
1913 (emulsifying apparatus)
1987 (viscosity measurement on plastic mixes)
2239 (servomechanism circuits)
2261 (diode bridge limiter for analogue computers)
2282 (Optics for Photographers—book)

17. METALS—FABRICATION AND USES

1582* "Let's Decide to Like Aluminum." C. E. Bathe and Bryce Brady. *Electrical World*, v. 137, Jan. 14, 1952, p. 85-88.

Describes the application of Al as a conductor material for urban distribution systems. Problems and how they were solved are surveyed.

1583 SAE Steel Committee Leads Alloys Conservation Program. *Iron Age*, v. 168, Dec. 27, 1951, p. 74-76.

Discusses technical advances, and applications of boron steel as it is used to replace the critical Ni, Mo, and Cr alloys.

1584 Durability of Aluminum and its Alloys—The Chemical Industries. *Light Metals*, v. 14, Oct. 1951, p. 541-546; Nov. 1951, p. 639-643; Dec. 1951, p. 662-667.

Last 3 parts of the 5th and last article in a series dealing with the durability of Al in various spheres of application. Second part discusses uses of Al in the textile industry. Last part deals with various applications.

1585* Designing Dies for Postforming Thermosetting Laminates. William I. Beach. *Machinery* (American), v. 58, Dec. 1951, p. 171-177.

Covers design and construction of the above. Discusses application of wood, Masonite, phenolic resins, Kirksite, Al, brass, and cast iron as die material. Illustrations.

1586 Forum on Technical Progress: Materials & Compounds. *Steel*, v. 130, Jan. 7, 1952, p. 241-242, 244, 246, 248, 251-252, 254, 257-258, 260, 262, 265, 268, 270, 272, 275, 278, 280, 282, 285.

Brief discussions by men from industry on the present situation and anticipations for 1952 regarding metal shortage, substitutes, and replacements.

1587 Boron Steels Supplement Scarce Nickel, Moly Alloys. Donald H. Ruhnke. *Steel*, v. 130, Jan. 14, 1952, p. 66, 69-70, 72, 75.

Outlines the present status of boron steels. Surveys results to date on hardenability, mechanical properties and users' reaction to these steels.

1588* Presidential Address. W. Barr. *West of Scotland Iron and Steel Institute Journal*, v. 57, 1949-50, p. 1-20.

Surveys results of metallurgical research for the development of new and better products. Discussed under the headings: structural mild steel, high-tensile structural steel, steels for high-temperature service, and stainless-clad steels. Deals with failures, causes, and mechanical testing.

1589* Steels for Specialized Applications. J. M. Mowat. *West of Scotland Iron and Steel Institute Journal*, v. 57, 1949-50, p. 167-187; disc., p. 187-192.

Discusses steels with distinctive properties for the above. Points out that chemical composition, methods of forging, heat treatment, and origin influence service efficiency. Reference is made in great detail to the latest developments in turbine rotors for high-temperature service where resistance to creep is of the utmost importance, and to the manufacture of forged-steel rolls.

See also:
1150 (cast vs. forged crankshafts)
1155 (Al die castings for vacuum cleaners)
1156 (advantages of gray-iron castings)

17. *Metals—Fabrication and Uses*

1261 (application of Sherardizing)
1323 (magnetic materials for instruments)
1364 (application of Mg and alloys)
1390 (applications of Cr-Ni steels)
1395 (Si-Cr cast irons in automobile cylinders)
1506 (electronic heating for metal working)
2332 (molybdenum as refractory metal)

18. POLLUTION AND WASTES

1590* The Photoelectric Measurement of Coal Dust Stains on Filter Paper. C. N. Davies and Mary Aylward. *British Journal of Applied Physics*, v. 2, Dec. 1951, p. 352-359.

Deposits of coal dust collected on filter paper from airborne clouds were studied in connection with their light-screening power. This depends on nature of the paper as well as on size and concentration of the particles. Nine kinds of paper were investigated, two of them in detail. Diffraction of light by the particles and effects of diffusion of light in the paper are discussed. Tables and graphs.

1591 Treatment of Waste Waters Containing Hydrogen Peroxide, Hydrazine, and Methyl Alcohol. G. E. Eden, A. M. Frede, and K. V. Melbourne. *Chemistry & Industry*, Dec. 15, 1951, p. 1104-1106.

Presents results of an investigation to determine possible methods of treating waste waters from an experimental station at which rocket motors are tested. An account is given of several methods of treating the effluent; and toxicity is discussed.

1592 The Role of Corona Discharge in the Electrical Precipitation Process. H. J. White. *Electrical Engineering*, v. 71, Jan. 1952, p. 67-73.

Various aspects of the electrostatic process of cleaning smoke-laden air, with emphasis on the part played by the corona discharge, are discussed. 17 ref.

1593* First Commercial Phenol Destruction Unit. *Engineering News-Record*, v. 148, Jan. 10, 1952, p. 30-31.

Presents flow diagram and brief description of chlorination plant for the above just completed by Pequanoc Rubber Co., Butler, N. J.

1594 Construction of an Automatic Air Sampling Apparatus. H. G. Bourne, Jr. *Heating and Ventilating*, v. 49, Jan. 1952, p. 65-68.

For determining day-long exposures of workers to dust of varying concentration, and for simultaneous collection of air samples at numerous stations over extended periods of time, a sampling device including a midget impinger and automatic siphon is described. Illustrations and diagrams.

1595 Air Pollution. Frederick G. Sawyer. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2687-2693.

Discusses the above problem, as it exists in the West, including means of abatement. Refers in particular to the city of Los Angeles.

1596 Atmospheric Pollution. Louis C. McCabe. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 97A-98A, 100A.

Methods which have been successful in eliminating odor nuisances in the Los Angeles area are described.

1597* Contaminants in the Air. *Industry and Power*, v. 62, Jan. 1952, p. 67-98.

Contains various articles giving a description of various types of the above. Legal aspects of air pollution and a briefing of the municipal codes are given. Selected individual articles are abstracted separately.

1598* Determining Smoke Density. *Industry and Power*, v. 62, Jan. 1952, p. 77-78.

Gives an explanation of several methods used for the above.

1599* Tools That Alleviate Pollution. *Industry and Power*, v. 62, Jan. 1952, p. 78-88.

Describes equipment available to industry to prevent air pollution. Characteristics and applications of each type of collector are explained, along with their limitations.

1600* Aerosol Studies at Georgia Tech. J. M. DallaValle and J. C. Lane. *Research Engineer* (Georgia Institute of Technology), Nov. 1951, p. 9-10, 21-23.

Discusses aerosols as factors of our environment and explains how new knowledge of their behavior is permitting us to minimize their bad effects and to capitalize on their good effects—from controlling rainfall to preventing and treating disease.

1601 Symposium On the Role of Ecology in Water Pollution Control. *Scientific Monthly*, v. 74, Jan. 1952, p. 3-20.

Consists of the following papers: "Role of Algae in Sewage Oxidation Ponds," Harvey F. Ludwig and William J. Oswald; "Protozoa as Indicators of Pollution," John L. Mohr; "Aspects of Water Pollution Study in the California and Great Basin Area," Curtis L. Newcombe; "Water Pollution: A Factor Modifying Fish Populations in Pacific Coast Streams," Robert M. Paul; and "Some Relationships of Phytoplankton to Pollution," Harry K. Phinney. 58 ref.

1602* Sedimentation and Flocculation Equipment for Treatment of Industrial Wastes. J. H. Bass and R. R. Evans. *Sewage and Industrial Wastes*, v. 23, Dec. 1951, p. 1523-1532.

Reviews some applications which have been made of flocculation and sedimentation equipment and procedures for the treatment of various industrial wastes. Case histories are presented for asbestos-paper wastes, cannery wastes, and oil wastes.

1603* Treatment of Board Mill Waste at River Raisin Paper Company, Monroe, Mich. M. F. Knack. *Sewage and Industrial Wastes*, v. 23, Dec. 1951, p. 1533-1536.

Discusses results of a study, conducted for a number of years, to reduce and treat the waste from the above plant.

1604* Studies of Biochemical Oxidation by Direct Methods. II. Effect of Certain Environmental Factors on the Biochemical Oxidation of Wastes. H. Heukelekian and I. Gellman. *Sewage and Industrial Wastes*, v. 23, Dec. 1951, p. 1546-1563.

Deals with the effects of environmental factors on the oxidation of sewage and industrial wastes. Considers effects of pH value, nutrient addition, substrate concentration, volume and source of sewage seed, and of seed adaptation.

1605* Underground Water Contamination by Chromium Wastes. Herbert W. Davids, and Maxim Lieber. *Water & Sewage Works*, v. 98, Dec. 1951, p. 528-534.

Surveys the above. Contamination was caused through leaching pit disposals. Methods of waste treatment are discussed.

Books

1606 Proceedings of the Sixth Industrial Waste Conference. 524 pages. Nov. 1951. Purdue University, Lafayette, Ind. *(Engineering Extension Dept., Series 76.)* (T21 P97e)

Presents 49 papers by various authors on the treatment of waste material. Included are treatment of cyanide waste, Cr waste disposal by ion exchange, and handling of metal-bearing wastes.

See also:
1431 (determination of contaminants in the atmosphere)
1440 (oxidation requirements in stream purification)
1443 (determination of phenolic wastes in water)
1444 (determination of phenol in coke plant wastes)
1463 (determination of chlorine in sewage wastes)
1484 (phenol determination in industrial wastes)
1513 (electron microscope in duct studies)
1613 (coal-smoke pollution)
1852 (sulfite as a coal binder to aid in stream pollution abatement)
2339 (treatment of industrial waste waters)

19. FUEL TECHNOLOGY

1607* The Extraction of Bitumens From Lignite. (In Russian.) N. G. Golovanov. *Doklady Akademii Nauk SSSR*, new ser., v. 79, July 1, 1951, p. 113-116.

Bituminous materials were extracted from lignites (from the Lvov and Zakarpatskii regions) by means of various binary

mixtures of butanol, dichlorethane, crude alcohol, refined alcohol, and benzol. Yields are tabulated and discussed.

1608 Ozonization Studies of Coal Constitution. C. R. Kinney and L. D. Friedman. *Journal of the American Chemical Society*, v. 74, Jan. 5, 1952, p. 57-61.

The reaction of ozone on coal and a number of related substances was studied. Contrary to results with other oxidants, moist ozone converts a significant fraction of the carbon of coal, carbon black, and lampblack directly to water-soluble products without intermediate formation of humic acids. 15 ref.

1609* Spontaneous Ignition of Coal. (In German.) H. G. Schein. *Brennstoff-Chemie*, v. 32, Oct. 17, 1951, p. 298-301.

Discusses various theories and opinions on the above. Experiments and observations point to the assumption that moisture is one of the most important factors. Data are graphed and tabulated. 16 ref.

1610* Some New Developments in the Understanding of the Physical Structure and Chemical Nature of Bright Coal. (In German.) I. G. C. Dryden. *Brennstoff-Chemie*, v. 32, Nov. 14, 1951, p. 321-324.

Review and discussion of the literature includes charted data. 14 ref.

1611 Kinetics of the Thermal Decomposition of Wood. R. H. Wright and A. M. Hayward. *Canadian Journal of Technology*, v. 29, Dec. 1951, p. 503-510.

Describes a study of the effect of particle size and temperature on the rate of decomposition of Western red cedar and Western hemlock. The experiments were part of a study of methods of producing fuel gas from waste wood.

1612* Flow, Diffusion, and Reaction in Coal Combustion. (In German.) E. Wicke. *Chemie-Ingenieur-Technik*, v. 23, Sept. 1951, p. 420-422.

Describes experiments made to determine effect of temperature and flow rate of combustion gases on products of combustion. Diagrams illustrate experimental apparatus; data are graphed.

1613 Coal Smoke—Its Nature and Prevention. A. C. Monkhouse. *Chemistry & Industry*, Dec. 22, 1951, p. 1129-1133.

Surveys the above. An estimate was made of the total pollution of the atmosphere by smoke. Factors influencing its dispersion are discussed. Prevention techniques are outlined. 16 ref.

1614* Superficial Oxidation of Carbon. (In Spanish.) Felipe Gonzalez Sanchez. *Combustibles*, v. 11, July-Sept. 1951, p. 224-243.

A literature review of progress on the above problem during the period 1940-50 is presented. Includes tables and charts. 78 ref.

1615* Rational Utilization of Inferior Types of Coal. (In Spanish.) Carlos Bertrand Bertrand. *Combustibles*, v. 11, July-Sept. 1951, p. 244-253.

Presents some ideas on the agglomeration of small and fine coal and on the utilization of pulverized coal. Includes tables.

1616* Current Coal Research. Coal Resource Studies in the United States During 1950. Paul Averitt. **Activities in Arkansas.** J. Norman Payne. **Coal Research in Illinois.** Arthur Bevan. **Coal Geology in Kansas.** Walter H. Schoewe. **Coal in Oklahoma.** Robert H. Dott. *Economic Geology and the Bulletin of the Society of Economic Geologists*, v. 46, Dec. 1951, p. 836-857.

1617 Economic Coal Conversion—Is It Possible? Joseph Pursglove, Jr. *Engineering Experiment Station News* (Ohio State University), v. 23, Oct. 1951, p. 7-8, 37-40.

Discusses various aspects of converting coal into liquid and gaseous fuels.

1618* How Much Heat Is Required to Crack Kerosene and No. 2 Fuel Oil? R. Kenneth Chafin and Thomas E. Corrigan. *Gas Age*, v. 108, Dec. 20, 1951, p. 19-25.

Investigation of heat requirements for the cracking process in manufacture of carburetted water gas shows it to be an endothermic reaction requiring 7000-13,000 B.t.u. per gal. of feed, varying with temperature at which cracking takes place, time of contact, and composition of the feed stock. Data are charted and tabulated.

1619* The Oxygen-Steam Producer. (In German.) *Gas und Wasserfach*, v. 92, Oct. 31, 1951, p. 273-277.

Discusses producers operated with oxygen-steam mixtures and with pure oxygen, and shows that the gas generator operated with oxygen has proved successful, especially with high ash content fuels. Diagrams and tables are presented.

1620 Producer Gas for Gas Turbines. Bruce O. Buckland, Arthur Y. Hillman, Jr., and Harlan W. Nelson. *General Electric Review*, v. 54, Dec. 1951, p. 12-26.

Describes experimental procedure and results of tests, on a small-scale gas producer, for the gasification of coal. The effects of pressure, rate of gasification, fuel properties (for 3 producer arrangements and modifications) as well as preheat and rapid load changes on operation problems (clinkering, coking, channeling, carry-over, and mage-gas quality) were investigated. Data are tabulated and graphed.

1621 Flame Propagation; Active Particle Diffusion Theory. Dorothy Martin Simon. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2718-2721.

Measured burning velocities of hydrocarbon-air mixtures were correlated with fundamental properties of the combustible mixtures. Results indicate that maximum flame velocities of hydrocarbon-air mixtures are consistent with an active-particle mechanism. The Tanford and Pease equation may be used to predict the burning velocities of hydrocarbon-air mixtures at atmospheric pressure and an initial temperature of 25°C. The correlation of equilibrium flame temperature and burning velocity can also be used for estimation of burning velocities. 12 ref.

1622 Flammability Limits of Hydrocarbon-Air Mixtures. James T. Di Piazza, Melvin Gerstein, and Robert C. Weast. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2721-2725.

Presents a systematic study to determine the effect of molecular structure on the flammability limits of pure hydrocarbon-air mixtures at reduced pressures and room temperature. Limit curves of pressure vs. fuel concentration for a number of pure hydrocarbons were obtained under identical experimental conditions. The effect of experimental variables was investigated and is discussed.

1623 Electrical Properties of Flames. Hartwell F. Calcote and Robert N. Pease. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2726-2731.

A study of the effect of longitudinal electric fields on blowoff limits, dead space, and flame pressure of Bunsen-burner flames to determine nature of the effect and significance of abnormal concentrations of ions in flames. Results indicate that the electric field has a strong influence on flame stability, the direction depending on the field polarity. A mechanical model in which momentum is transferred from positive ions to the gas qualitatively explains most of the results. 18 ref.

1624 Combustion in Bunsen Flames. Frank R. Caldwell, Herbert P. Broida, and Jerome J. Dover. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2731-2739.

Apparent flame speeds and line-reversal temperatures of methane-air mixtures were measured at atmospheric pressure, and effects of water vapor, gas velocity, and nozzle temperature on flame speeds were determined. Briefly describes spectroscopic equipment for determination of rotational temperatures and concentration of radicals. Some preliminary observations on an acetylene flame are presented. Results with this apparatus are encouraging. 22 ref.

1625 Hydrocarbon Flame Spectra. George A. Hornbeck and Robert C. Herman. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2739-2757.

Surveys hydrocarbon flame spectra in the range 2000 to 9000 A. in order to establish the identity of band systems obtained under a variety of flame conditions. Describes sources and techniques required to enhance the spectra of specific molecular species by means of variations in oxygen-fuel ratio. Results are presented chiefly in a selected series of densitometer tracings of bands obtained with a wide variety of ratios. The spectra of diatomic and polyatomic molecules, particularly the "hydrocarbon" and "deuterocarbon" flame bands, are discussed and some comments are made concerning kinetic mechanisms involved. Results are significant principally in that

19. *Fuel Technology*

they provide the spectroscopic investigator of flames with a pictorial means of rapid identification. 30 ref.

1626 Kinetics of Combustion. Relation to Emission Flame Spectroscopy. K. J. Laidler and K. E. Shuler. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2758-2761.

Indicates the utility and the limitations of the spectroscopic study of flames in the elucidation of combustion processes. 27 ref.

1627 Preflame Combustion of Hydrocarbons; Spectroscopic Studies of Reaction Intermediates. J. R. Thomas and H. W. Crandall. **Identification of β-Dicarbonyl Compounds.** M. R. Barusch, H. W. Crandall, J. Q. Payne, and J. R. Thomas. **Possible Intermediates to β-Dicarbonyl Formation.** M. R. Barusch, J. T. Neu, J. Q. Payne, and J. R. Thomas. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2761-2769.

A recording ultraviolet spectrophotometer was employed for kinetic studies. Time dependence of optical density was measured using light of varying wave lengths. The rate of formation of formaldehyde increased during the induction period and there was rapid production of formaldehyde in the cool flame. Compounds absorbing at 2050 A. were also formed autocatalytically during the induction period and were produced extremely rapidly in the cool flame. The intermediates which give rise to the 2600 A. absorption peak and referred to by Ubbelohde as compound X were identified as β-dicarbonyl compounds. A mechanism to explain β-dicarbonyl formation is proposed. 21 ref.

1628 Fundamental Flame Velocities of Hydrocarbons. Melvin Gerstein, Oscar Levine, and Edgar L. Wong. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2770-2772.

Flame velocities of a series of alkadienes and cycloalkanes were determined by a modified tube method to illustrate the effect of molecular structure on flame velocity. Presents results and conclusions.

1629 Burning Velocities; Acetylene and Dideuteroacetylene With Air. Raymond Friedman and Edward Burke. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2772-2776.

Provides data for comparison with flame theories. Results are given for the ratio of burning velocities of acetylene and dideuteroacetylene with air, over a range of mixtures. A second series of measurements shows the dependence of burning velocity on the fraction of protium replaced by deuterium. Results are considered in terms of the Tanford-Pease theory, which also involves the equilibrium atomic protium-deuterium ratio, the diffusion-coefficient ratio, and the reaction-rate constant ratio.

1630 Vapor Phase Oxidation of Hexanes. E. J. Kahler, A. E. Bearse, and G. G. Stoner. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2777-2781.

An investigation to obtain information on reactions occurring in hydrocarbon-air mixtures prior to ignition. Covers the fundamental chemistry of the oxidation process and explains the relationship between hydrocarbon structure and performance in an internal combustion engine. 22 ref.

1631 Partial Combustion of Methane With Oxygen. Richard Mungen and M. B. Kratzer. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2782-2787.

Results of a pilot plant study of the above as part of a program to develop a synthetic-fuels process. Shows that the above is a practical method of supplying feed gas to the hydrocarbon synthesis process.

1632 Hydrocarbons in the Diesel Boiling Range. R. W. Hurn and H. M. Smith. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2788-2793.

Gives data which show the manner in which simple changes in hydrocarbon structure affect autoignition lag of fuels. The normal paraffins, C_7 through C_{18}, the corresponding α-olefins, and several naphthenic types were investigated. Forms the framework for a more comprehensive cataloging of the ignition and combustion characteristics of the principal hydrocarbons found in Diesel fuels.

1633 Initiation of Detonation in Gases. G. B. Kistiakowsky. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2794-2797.

A qualitative review of published theories and facts plus some new thoughts on the structure of stationary detonation waves and the mechanism of initiation of detonation by flames. Qualitative comments on the probable mechanism of spinning and pulsing nonstationary detonation waves conclude the article. 26 ref.

1634 Lean Flammability Limit and Minimum Spark Ignition Energy. John B. Fenn. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2865-2869.

Describes the relationship of the above. Relates flame temperature at the lean flammability limit to the activation energy of the rate-determining reaction in a flame-front, and develops a theory of minimum spark ignition energy based on this concept of activation energy.

1635 Spontaneous Ignition Temperatures; Commercial Fluids and Pure Hydrocarbons. Joseph L. Jackson. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2869-2870.

Tabulated values of spontaneous ignition, and ignition delay, as determined in a crucible-type apparatus, are presented for 94 pure hydrocarbons and 15 commercial fluids. These data should be useful to investigators who are concerned with thermal ignition processes, such as those encountered in internal-combustion engines. The data should also be helpful in establishing relative fire hazards.

1636 Precision of Expansion Tests on Coal; Relation of Expansion to Other Variables. B. W. Naugle, J. D. Davis, and J. E. Wilson. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2916-2922.

Statistics on the reproducibility of both the sole-heated oven and the large vertical expansion oven are given in terms of the normal probability law. They include correlations between expansion and coal particle size as well as wall pressure and internal gas pressure. Formulas are presented for estimation of expansion of single coals and certain coal blends.

1637 Derivatives From the Low Temperature Carbonisation of Coal. Part 2. *Industrial Chemist and Chemical Manufacturer*, v. 27, Dec. 1951, p. 545-550.

Completes review of the process and plant used at the works of the British Diesel Oil and Petrol Co., Ltd. for the production of an extensive range of derivatives from crude oil obtained by low-temperature distillation of coal.

1638* A Mechanism of Intense Gaseous Combustion. A. H. Howland and W. A. Simmonds. *Journal of the Institute of Fuel*, v. 24, Nov. 1951, p. 252-256.

Describes investigation of the mechanism of combustion when a premixed supply of air and a gaseous fuel is burned inside a refractory tube. The combustion is shown to be of a novel type and to consist of a series of explosions, so that the mechanism is a repetition of a cycle of events. Includes oscillograms of burner noise, stroboscopic motion-picture records, ultraviolet emission spectra, and spark Schlieren photographs.

1639* Automatic Control Systems for the Coal Feed of Gas Producers. S. A. Burke and G. A. Sparham. *Journal of the Institute of Fuel*, v. 24, Nov. 1951, p. 257-264.

Describes series of tests on a Morgan producer to develop and compare new methods for automatic regulation of the coal-feed rate. The systems tested were: use of gas offtake temperature alone as the controlling variable; and direct proportioning of coal feed to air flow, using gas offtake temperature merely as a slow resetting integral action. Continuous recordings were made of all variables, including fuel-bed contours. Choice of control system is shown to depend on several technical and economic factors.

1640* Flame Radiation Research Joint Committee: Reports of 1949 Trials at Ijmuiden. I. Introduction. J. J. Broeze, G. Ribaud, and O. A. Saunders. **Purpose and Plan of the Experiments.** J. E. de Graaf and M. W. Thring. **Review of Previous Work on Luminous Radiation.** F. M. Comerford. **Heat-Flow Meters.** R. T. Fowler, D. A. Richardson, and M. Riviere. **Total-Radiation Pyrometers.** E. J. Burton, R. Mayorcas, M. Michaud, W. H. Pritchard, and M. Riviere. **Suction Pyrometry.** I. M. D. Halliday. **The Main Experiments.** R.

Mayorcas. **Appendix. Control and Instrumentation of the Experimental Furnace.** G. W. Stein Callenfels. *Journal of the Institute of Fuel*, v. 24, Nov. 1951, p. S1-S16.

First part of a report on research into the phenomena of thermal radiation from flames, now being carried out at Ijmuiden, Holland, under the auspices of the Flame Radiation Research Joint Committee, by a team of British, Dutch, French, and Swedish engineers and scientists. This report marks the completion of the first stage of a noteworthy example of international scientific collaboration. A more detailed account is appearing in *Chaleur et Industrie*, 63 ref.

1641* Don't Sell Anthracite Short. A. W. Gauger. *Utilization*, v. 5, Dec. 1951, p. 49-53.

Discusses anthracite as to availability, versatility, and the attitude of the industry.

1642* The Reaction Mechanism of Carbon Combustion at Atmospheric Pressure. (In German.) F. W. Baetke. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie*, v. 55, Oct. 1951, p. 655-657.

Experiments were made at different rates of air flow in a carbon-tube laboratory apparatus. Results are charted, tabulated, and analyzed. 10 ref.

Miscellaneous Publications

1643 Flame Velocities Over a Wide Composition Range for Pentane-Air, Ethylene-Air, and Propyne-Air Flames. Dorothy M. Simon and Edgar L. Wong. National Advisory Committee for Aeronautics, Research Memorandum E51H09, Oct. 18, 1951, 40 pages. (TL782 Un3rm)

Investigation on the above showed that an active particle diffusion mechanism of flame propagation is consistent with observed changes in flame velocity with fuel concentration in air for the 3 hydrocarbons studied. Tables, diagrams and graphs. 28 ref.

1644 Annual Report of Research and Technologic Work on Coal, Fiscal Year 1950. Arno C. Fieldner and Sidney Gottley. U. S. Bureau of Mines, Information Circular 7618, Nov. 1951, 80 pages. (TN21 Un3i)

Presents a comprehensive treatment on the above. An over-all view of our coal, oil, and natural-gas reserves is given. A study of future petroleum supply and demand is presented and current and future aspects of chemistry in the coal industry are considered. Tables, diagrams, and graphs. Numerous references.

1645 The Second Underground Gasification Experiment at Gorgas, Ala. James L. Elder, M. H. Fies, Hugh G. Graham, R. C. Montgomery, L. D. Schmidt, and E. T. Wilkins, U. S. Bureau of Mines, Report of Investigations 4808, 72 pages. (TN21 Un3r)

Presents detailed description of above work being done to extract the energy contained in unmined coal and to obtain fundamental knowledge relating to underground gasification of coal.

1646 Properties of Colorado Oil Shale. K. E. Stanfield, I. C. Frost, W. S. McAuley, and H. N. Smith. U. S. Bureau of Mines, Report of Investigations 4825, Nov. 1951, 27 pages. (TN21 Un3r)

Presents results of analytical studies made on 2 series of oil-shale samples from the Mahogany ledge of the Green River formation near Rifle, Colo. It was made to determine the character of the various grades of oil shale being mined and processed into shale oil and refined products at the Bureau of Mines Oil-Shale Demonstration Plant. Data are tabulated and graphed. 34 ref.

Books

1647 Bränsle och Kraft. (Fuels and Power.) K. G. Ljungdahl. 109 pages. 1951. Ingeniörsvetenskapsakademien, Stockholm, Sweden. (Report 20.) (TP317.S8 L76b)

Graphs and tables supplement this report on fuel and power resources (including present and future prospects for hydroelectric, atomic, and wind power), in Sweden.

1648 Poverkhnostnoe Besplamennol Gorenie. (Flameless Surface Combustion.) M. B. Ravich. 355 pages. 1949. Academy of Sciences of the U.S.S.R. Moscow and Leningrad, U.S.S.R. (QD516 R19p3)

Presents results of research in the field of surface flameless combustion performed in the fuel and combustion laboratories of G. M. Krzhizhanovskii's Power Institute of the Academy of Sciences under the author's direction, and also in other research organizations. Contains new material on flameless combustion of natural and compressed gases and their properties and possible spheres of application. Influence of various refractories on the process is discussed at length. Applications in industry, including miscellaneous metallurgical processes, are described in detail. Numerous graphs and diagrams. 399 ref.

See also:

1662 (coal composition vs. stoker performance)
1687 (B and Si compounds in fuel)
1690 (dual fuel tests in Diesels)
1806 (low temperature distillation of coal)
1807 (producing gases from coal)
1906 (heat of combustion of hydrocarbons)
1976 (flammability of C_nH_{2n-6} aromatics)
2310 (coal economics)
2311 (worldwide fuel economics)

20. HEATING, DRYING, AND AIR CONDITIONING

1649* Contribution to the Graphical Study of Variable Heat Regimes. Jean Jacq. (In French.) *Chaleur & Industrie*, v. 32, Nov. 1951, p. 311-315.

Describes an expansion of the Binder and Schmidt graphical integration method (which makes it possible to trace temperature isochrones and to figure densities of calorific flux in the lining of an enclosure when the evolution of the interior temperatures is known), in order to determine the characteristics of the source necessary to raise the temperature in a building to a given temperature in a given time, and in order to predict the cooling curve of a building after heating has stopped. Includes detailed mathematical analysis.

1650* The Production of High Temperatures in Industry by Town Gas. *Coke and Gas*, v. 13, Dec. 1951, p. 431-434. (A condensation.)

Includes such factors as the selection of heating systems, the development of a low-pressure natural-draft high-temperature furnace, combustion-chamber design, and performance characteristics. Diagrams.

1651* Characteristics of the Development of the Industrial Use of Gas. (In German.) Walter Litterscheidt. *Gas- und Wasserfach*, v. 92, Oct. 31, 1951, p. 260-268.

Discussion on above deals primarily with gas-fired furnaces, utilization of flue gases, and treatment of metals with gases. Includes diagrams, graphs, photographs, and references.

1652* The Design and Application of Waste Heat Boilers. Robert Cubberly and Kelvin J. Ray. *Heat Engineering*, v. 26, Dec. 1951, p. 212-218.

Considers principal factors important in the above. Discussion is limited to the steam boiler including the steam superheater and feedwater economizer. Schematic diagrams.

1653 Gas Burners and Combustion Systems. H. F. Rehfeldt. *Industrial Heating*, v. 18, Nov. 1951, p. 1976-1978, 1980, 1982, 1984, 2132; Dec. 1951, p. 2164-2166, 2168, 2170, 2172, 2174, 2176.

Describes the various types of equipment commonly employed with gas-fired industrial heat-utilization equipment. Includes diagrams.

1654* Cross-Fired Spreader Stokers. J. S. Bennett. *Industry and Power*, v. 62, Jan. 1952, p. 64-66, 142.

Discusses the trend toward using higher capacity steam generators fired with spreader stokers. Data on typical large units are tabulated, while comments are made not only about 300,000 lb. per hr. units, but also about ratings up to and higher than 500,000 lb. per hr. Fuel-burning rates, fly-ash problems, and required changes in furnace designs are factors considered.

20. *Heating, Drying, and Air Conditioning*

1655* Fundamentals Required to Reduce Smoke. *Industry and Power*, v. 62, Jan. 1952, p. 89-90.

Discusses the above. Outlines 5 steps to be followed to successfully eliminate smoke.

1656* Utilizing Overfire Air. *Industry and Power*, v. 62, Jan. 1952, p. 91.

Overfire jets prevent smoke before it forms by forcing air into the furnace to aid in the complete combustion of unburned carbon and gases. Benefits to be derived are discussed. Diagrams.

1657* Smokeless Oil Burner Operation. *Industry and Power*, v. 62, Jan. 1952, p. 92-93.

Surveys causes of smoke in oil-fired boilers. Ways to minimize them are discussed.

1658* Progress Review No. 18: Oil-Burning Equipment. G. J. Gollin. *Journal of the Institute of Fuel*, v. 24, Nov. 1951, p. 265-267, 276.

Covers domestic and industrial types. 15 ref.

1659* Fuel Economy. IV. Furnace Efficiency. R. J. Sarjant. *Research*, v. 4, 1951, p. 562-568.

Surveys the above giving a brief discussion on fuels and firing, mechanization, instrumentation, and heat recovery appliances. Diagrams. 16 ref.

1660* Evaluation and Development of Kiln Efficiencies. Part IX. Evaluating Radiation Loss From Rotary Kilns. Victor J. Azbe. *Rock Products*, v. 54, Dec. 1951, p. 99-101, 136-137.

Presents graphs and charts illustrating results of experimentation on the above. Discusses means of preventing the loss of heat, and improving kiln efficiency.

Miscellaneous Publications

1661 Electric Home Heating. Earl E. Parks. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 828-831. (Tk1 Am35tr.)

Presents a general discussion on the above. Advantages over other systems are given.

1662 Correlation of Domestic Stoker Combustion With Laboratory Tests and Types of Fuels. IV. Combustion Tests of Illinois and Other Coals. Roy J. Helfinstine. State Geological Survey, State of Illinois, Report of Investigations 151, 1951, 46 pages. (TN21 I6r.)

Describes tests to determine the relationship between coal composition (as determined by standard analytical tests) and the performance characteristics of coals that exhibit a wide range in combustion behavior when burned in a domestic stoker. Data are graphed.

Books

1663 Building Insulation; Principles and Application of Heat and Sound Insulation for Buildings. Ed. 4. Paul Dunham Close. 402 pages. 1951. American Technical Society, Chicago. (TH1715 C62b4.)

A brief history of the development of the above is given. Information regarding the various types of insulation and general methods of application are presented. The study of the heat-loss coefficients of insulating and building materials is followed by practical applications. Economic phases are discussed.

1664 The Heat Pump Guide. C. R. Freberg, S. L. Pappas, and F. R. O'Brien. 167 pages. Nov. 7, 1949. Southern Research Institute, Birmingham, Ala. (TJ266 F87h.)

Presents a short discussion of the history and development of the above, a brief review of the operating principles, and a more elaborate discussion of some of the installation problems. Problems concerned with the design of the equipment itself are not covered except as they affect application of the units.

See also:

1648 (flameless surface combustion equipment)
1724 (rotary-kiln design)
1797 (ovens for TV-tube production)
2281 (infrared drying in the graphic arts)

21. PRIME MOVERS

1665* Rockets for Aircraft Propulsion. S. Allen. *Aeroplane*, v. 81, Dec. 7, 1951, p. 726-727.

Discusses the basic problems of the liquid-fuel rocket motor. Briefly surveys types of propellant combinations.

1666* Turbine Research and Development. *Journal of the American Society of Naval Engineers*, v. 63, Nov. 1951, p. 1006-1007. (Reprinted from *Shipbuilder and Marine Engine Builder*, July 1951.)

Discusses development of new constructional features, and the preparation of designs of turbines and gearing for new vessels.

1667* Purification of Diesel-Engine Fuels in Relation to Cylinder-Liner Wear. *Journal of the American Society of Naval Engineers*, v. 63, Nov. 1951, p. 1013-1018. (Reprinted from *British Motor Ship*, May 1951.)

Discusses the operating advantages of boiler oil. Stresses the importance of temperature and rate of throughput. Gives the fundamentals of fuel purification, and suggestions regarding variations in procedure with certain grades of fuel.

1668 Two Stroke Diesel of Unique Design. *Automotive Industries*, v. 106, Jan. 1, 1952, p. 36-37.

Gives illustrations and diagrams of the above, designed by Lever Motors Corp., Charleston, Ill. By use of the leverage system, an extremely long dwell at the bottom of the piston stroke is attained.

1669 Gas Turbines Necessary for Small Aircraft Progress. C. F. Bachle. *Automotive Industries*, v. 106, Jan. 1, 1952, p. 46-49. (A condensation.)

Discusses factors to be considered in evaluating the propulsive system in gas turbines. Graphs, tables, and diagrams.

1670 3 New Ideas for Rocket Fuels. *Aviation Week*, v. 55, Dec. 17, 1951, p. 24, 26, 28, 30.

A beam of light, a stream of electrons, or nuclear propulsion are discussed as possible methods for rocket propulsion. Considers the requirements in designing a suitable engine.

1671* Optical Vibration Measurements on Moving Blades of Axial Compressors and Gas Turbines. (In German.) G. Peters. *Brennstoff-Wärme-Kraft*, v. 3, Nov. 1951, p. 384-385.

Describes and diagrams apparatus and procedure.

1672* Symposium on Satellite Vehicles. *Journal of the British Interplanetary Society*, v. 10, Nov. 1951, p. 237-299.

Consists of following articles: "The Importance of Satellite Vehicles in Interplanetary Flight," W. von Braun; "The Artificial Satellite," L. R. Shepherd; "Interplanetary Travel Between Satellite Orbits," L. Spitzer; "Descent From Satellite Orbits Using Aerodynamic Braking," T. Nonweiler; "Meteor Hazards to Space-Stations," M. W. Ovenden; "Minimum Satellite Vehicles," K. W. Gatland, A. M. Kunesch, and A. E. Dixon; and "Establishing Contact Between Orbiting Vehicles," R. A. Smith.

1673* Some Fuel and Power Projects. H. Roxbee Cox. *Engineer*, v. 192, Nov. 23, 1951, p. 664-666; Nov. 30, 1951, p. 685-686; Dec. 7, 1951, p. 723-725.

Surveys the above. Illustrates and diagrams open-cycle coal-burning gas turbines. These turbines were designed solely to use poor quality fuel.

1674* The Applicability of Gas Turbine Technology. W. E. P. Johnson. *Engineer*, v. 192, Nov. 30, 1951, p. 707-708.

Discusses the above. Various systems for the utilization of waste heat are described. Diagrams.

1675* Methods Used for Obtaining Pressure Diagrams. *Engineer*, v. 192, Dec. 7, 1951, p. 727-729. (A condensation.)

Surveys the above as applied to reciprocating internal-combustion engines, giving an account of recently developed automatic apparatus.

1676* The Measurement and Interpretation of Machinery Noise With Special Reference to Oil Engines. C. H. Bradbury. *Engineer*, v. 192, Dec. 14, 1951, p. 773-775. (A condensation.)

Gives experimental conditions, results, and interpretation. Data are discussed and shown graphically.

1677* "Orenda" Axial-Flow Turbo-Jet Engine. *Engineering*, v. 172, Dec. 7, 1951, p. 735.

Describes the above. Illustration.

1678* Measuring Stresses in Aircraft Turbines. Denis A. Drew. *Engineering*, v. 172, Dec. 7, 1951, p. 761-763.

Results of an investigation of the cause of turbine bucket failures on aircraft gas turbines. Stresses were studied by use of wire strain gages. Diagrams and illustrations.

1679 The Development of Air Expansion Turbines. E. Crewdson and P. E. F. Crewdson. *Industrial Chemist and Chemical Manufacturer*, v. 27, Dec. 1951, p. 551-553.

The results of experiments made with two types of air expansion turbines, inward flow reaction, and outward flow impulse, are described, together with comparative data. Materials of construction are discussed. Duralumin, bronze, and 18/8 stainless steel are all suitable.

1680 Autoignition by Rapid Compression. J. C. Livengood and W. A. Leary. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2797-2805.

This technique provides a convenient means of recording the pressure-time histories and the inflammation characteristics of combustible mixtures which react too rapidly to be studied in conventional bombs. Test results are described. Discusses difficulties arising from the lack of a consistent nomenclature and the absence of definitive experimental measurements. Photographs and diagrams. 18 ref.

1681 Two-Stage Autoignition of Some Hydrocarbons. William J. Levedahl and Frank L. Howard. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2805-2814.

Presents results of a series of experiments carried out in a motored engine, as part of an investigation of the causes of combustion knock. Several fuels were caused to selfignite by the heat developed in compression. Observations were made of pressure generated, emission of light, and ionization in the combustion chamber. Graphs illustrate stages of reaction.

1682 Atmospheric Pressure Apparatus for Studying Ignition Delay. A. Boodberg and I. Cornet. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2814-2818.

Presents results of an investigation of ignition delay at various temperatures for a commercial Diesel fuel and isoamyl nitrate mixtures performed in a special atmospheric pressure tester. Gives anomalous combustion behaviors for isoamyl nitrate concentrations of 0.25-2% by volume. The data indicate that two or more competing mechanisms of ignition are present in the systems investigated.

1683 Adiabatic Flame Temperature in Jet Motors. William S. McEwan and Sol Skolnik. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2818-2822.

Several systematic procedures for performing the above are briefly reviewed and evaluated. Gives effects of flame temperature of propellants with different enthalpies.

1684 Carbon Formation in Gas Turbine Combustion Chambers. E. S. Starkman, A. G. Cattaneo, and S. H. McAllister. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2822-2826.

Describes a small combustion chamber used to study the influence of fuel and operating factors on the carbon deposits found in combustion-chamber liners. Discusses the resulting laboratory test for carbon deposits and derivation of a formula by which the carbon-deposition tendency of a fuel can be predicted from its characteristics.

1685 Tetraethyllead in Various Pure Hydrocarbons; Antiknock Effectiveness. Wanda I. Zang and Wheeler G. Lovell. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2826-2833.

Results show that the addition of a given amount of tetraethyllead to paraffins and naphthenes results in a constant percentage gain in relative potential power regardless of the clear antiknock level or engine operating conditions. The effectiveness of addition of tetraethyllead to aromatics and olefins is variable, but may be related in fairly simple ways to molecular structure and conditions of test. Important as a basis for estimating potentialities for improvements in utility of tetraethyllead in commercial gasolines.

1686 Knock Resistance of Pure Hydrocarbons; Correlation With Chemical Structure. H. K. Livingston. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2834-2840.

Presents results of experiments which show a correlation between current theories of engine knock and hydrocarbon oxidation. The resistance of hydrocarbons to knock is a function of structural factors that depend on electronic effects contributed by: methyl, tert-alkyl, vinyl, methylene and phenyl groups. The relative effects of these groups are summarized by 8 rules that permit calculation of "structural retardation factors" for hydrocarbons from chemical structure alone. 31 ref.

1687 Gasoline Combustion; Effect of Boron or Silicon Compounds. E. C. Hughes, S. M. Darling, J. D. Bartleson, and A. R. Klingel, Jr. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2841-2844.

Presents results of an investigation to determine the ability of B or Si compounds to affect the carbonaceous material and inorganic Pb compounds which form over the exposed surfaces of the combustion chamber and cause the octane requirement of the engine to increase. 25 ref.

1688 Precombustion Reactions in an Engine. Cleveland Walcutt and Ellis B. Rifkin. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2844-2849.

Gives results of an investigation of the reactions of air-fuel mixtures in an engine prior to combustion. Indicates that resistance to knock cannot be related directly to the heat liberated when a fuel undergoes precombustion reactions. Some evidence shows that the antiknock effectiveness of tetraethyllead depends on the presence of intermediate products formed during the precombustion reaction. Application of these results to the spark ignited engine shows that there may be important effects on power output as a result of precombustion reactions.

1689 Diesel Engine Exhaust Products. Ernest W. Landen. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2849-2854.

Gives results of an investigation to determine whether the exhaust condensation method is suitable for evaluating the products exhausted from Diesel engines when various fuels are burned or various types of engines are used for a given fuel. Differences in fuels can be measured by this method. It may be possible to evaluate engine deposit-forming tendencies and the exhausted material of engine combustion systems by this technique.

1690 Dual-Fuel Combustion in Diesel Engines. Martin A. Elliott and Rogers F. Davis. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2854-2864.

Presents results of tests made with natural gas, propane, butane, and hydrogen. These can be applied to the design and operation of dual-fuel combustion systems. 10 ref.

1691 Guided Missiles—A New Field for the Radio Engineer. Simon Ramo. *Proceedings of the I.R.E.*, v. 40, Jan. 1952, p. 3.

Presents an analytical study of the technical problems facing the designer of guided missiles, and the extent to which the solutions draw upon civilian communications techniques and on the field of advanced mechanical engineering.

1692 A New Method of Calculation of Reheat Factors for Turbines and Compressors. Joseph Kaye and K. R. Wadleigh. *Journal of Applied Mechanics*, v. 18 (*Transactions of the American Society of Mechanical Engineers*, v. 73), Dec. 1951, p. 387-392.

A simple method is presented for rapid accurate calculation of reheat factors for adiabatic turbines and compressors with an infinite number of stages.

1693* Liquid Propellant Rockets and Their Applications. J. Humphries. *Machinery Lloyd* (Overseas Ed.), v. 23, Nov. 24, 1951, p. 68-71, 73, 75, 77, 79.

Brief review of the method of operation of liquid-propellant rocket motors; mentions some of the problems involved in their design and indicates some of their applications.

1694 Recent Development of the Reheat Steam Turbine. Robert L. Reynolds. *Mechanical Engineering*, v. 74, Jan. 1952, p. 9-14.

Reviews briefly the advantages and disadvantages of the reheat

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cycle, points out the degree of acceptability of this type of turbine, describes typical turbine designs, and discusses operating experiences and problems. 17 ref.

1695* Horizons Unlimited for Gas Turbines? *Power*, v. 96, Jan. 1952, p. 71-75, 212, 214.

Discussion of present status and future prospects is illustrated by cut-away and schematic diagrams.

1696* Supersonic Propellers. W. F. Hilton. *Journal of the Royal Aeronautical Society*, Jan. 16, 1952, p. 751-761.

Theory and design of the above are discussed. Schematic diagrams and graphs.

1697* Instrumentation for Testing Aircraft and Aero-Engines. C. N. Jaques. *Journal of the Royal Aeronautical Society*, Jan. 16, 1952, p. 762-781.

Discusses basic principles of dynamic measurements; illustrates the measurement of physical quantities by examples of some of the newer instruments; refers briefly to data-transmission systems; and describes some of the continuous-trace recording equipment now available from British sources. Measurements of acceleration; engine speed and torque; fuel flow; and stresses are described.

Miscellaneous Publications

1698 Progress in the Development of Large Turbine Generators. E. D. Huntley and H. D. Taylor. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 580-589; disc., p. 589-592. (TK1 Am35tr.)

Presents a survey of the above with a description of some of the more interesting and important design features which contribute to the reliability, efficiency, and good operation of present-day machines. A final section deals with the continuing increase in size of 3600-rpm. generators. Illustrations. 14 ref.

1699 Pulse-Time Modulation Telemetering Systems for Rocket Application. John T. Mengel. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 599-605. (TK1 Am35tr.)

Design and operational data are given for a 23-channel, 1-kw. peak-pulse-power system and for an improved 30-channel 4-kw. peak-pulse-power system, together with photographs of the equipment and sample records obtained.

1700 Determination of Ram-Jet Combustion-Chamber Temperatures by Means of Total Pressure Surveys. I. Irving Pinkel. National Advisory Committee for Aeronautics, Technical Note 2526, Dec. 1951, 10 pages. (TL570 Un3t.)

A method is described for the above. A working chart is presented.

1701 An Analytical Investigation Using Aerodynamic Limitations of Several Designs of High Stage Pressure Multistage Compressors. Charles H. Voit and Arthur R. Thomson. National Advisory Committee for Aeronautics, Technical Note 2589, Dec. 1951, 56 pages. (TL570 Un3t.)

The above was made to determine whether the average stage pressure ratios of present-day commercial compressors can be raised. The investigation considers certain design limits and the manner in which these limits are affected by the principal design variables of an inlet stage, a typical intermediate stage, and a typical final stage of a multistage axial-flow compressor. Two velocity diagrams were investigated, the wheel plus vortex and the symmetrical at all radii diagrams. Data are graphed.

Books

1702 Torque Converters or Transmissions. P. M. Heldt. Ed. 4. 476 pages. 1951. P. M. Heldt, Nyack, N.Y. (TL260 H36t4.)

Discusses the above for use with combustion engines in road and rail vehicles, tractors, and locomotives. Study is devoted to the theory of the hydro-kinetic torque converter and its working principles.

1703 Osnovy Teploenergetiki. (Basic Thermal Energetics.) Ed. 3. A. M. Litvin. 216 pages. 1946. Government Publishing House for the Power Industry, Moscow and Leningrad. U.S.S.R. (TJ265 L73o.)

Presents fundamental thermodynamic principles in elementary fashion. Describes practical application to construction and operation of power stations and engines.

See also:
1620 (producer gas for gas turbines)
1630 (hydrocarbon structure vs. engine performance of fuels)
1633 (initiation of detonation in gases)
1757 (aircraft-engine lubricating systems for cold climates)

22. CERAMICS

1704 Firing and Cooling Shrinkage Behavior of Structural Clay Bodies. Roland R. Van Der Beck and J. O. Everhart. *Journal of the American Ceramic Society*, v. 34, Dec. 1951, p. 361-365.

Length change determinations on 19 sewer-pipe bodies were used to study the shrinkage of structural clays. Determinations over both heating and cooling cycles were included. A description of the techniques employed in securing the data, as well as a discussion and interpretation of the results, is given. Particular emphasis is placed on the possibility of conserving fuel and firing time, as well as reducing rejects, by applying information obtained.

1705 Viscosity Studies of Titania Porcelain Enamels. Werner Heimsoeth and F. R. Meyer. *Journal of the American Ceramic Society*, v. 34, Dec. 1, 1951, p. 366-370.

The influence of TiO_2 on the viscosity curve of various porcelain enamels, particularly B_2O_3-free enamel frits, was determined by measuring the absolute viscosity at temperatures of 1300-1800°F. with the aid of a drawn-ball viscosimeter. Data are graphed and tabulated.

1706 Single-Number Tolerances for Colored Glass Specifications. Norbert J. Kreidl and Tyler G. Pett. *Journal of the American Ceramic Society*, v. 34, Dec. 1951, p. 370-374.

Shows that color specifications can be given as simply as one would give other dimensions of objects, and that equipment is available for quickly determining if a sample is within a specification.

1707 Elastic and Flow Properties of Dense, Pure Oxide Refractories. James F. Wygant. *Journal of the American Ceramic Society*, v. 34, Dec. 1951, p. 374-380.

Mechanical properties, including creep rates, were measured for slip-cast magnesia, hydrostatically pressed magnesia, thoria, zircon, and mullite. Elastic and flow properties were determined primarily by the crystal structure and atomic bonding of the oxides and secondarily by grain-boundary conditions. Data are tabulated and graphed.

1708 The Location of Sodium by Nuclear Activation in Glass-Corroded Tank Block Refractories. K. M. Laing, D. E. Emhiser, J. V. Fitzgerald, and R. E. Jones. *Journal of the American Ceramic Society*, v. 34, Dec. 1951, p. 380-383.

The above was determined by two nuclear-physics techniques, activation and isotope tracing. Detection of the radioactive atoms was accomplished by photographic plates (autoradiography). Corrosion by molten glass was carried out either in a small glass-melting tank or in hot glass in a platinum crucible. Clay-grog and fused-cast refractories were tested.

1709 Some Semiempirical Methods for Estimating the Entropies of Oxides, Silicates, and Titanates, and the Prediction of Reaction Equilibria and Yields. W. J. Knapp and W. D. van Vorst. *Journal of the American Ceramic Society*, v. 34, Dec. 1951, p. 384-387.

The above is described, and application of the method to 20 compounds is shown. As a result it was found possible to predict certain solid-phase reaction equilibria and approximate yields, providing heat-capacity data, or enthalpies, at elevated temperatures are available. Tables and graphs.

1710 Anelasticity of Glass: III. Effect of Heat-Treatment on the Internal Friction of Tank Plate Glass. IV. Correlation of Electrical Strain With Mechanical Strain in Glass.

J. V. Fitzgerald. *Journal of the American Ceramic Society*, v. 34, Dec. 1951, p. 388-391.

Presents results of an investigation on the above. Data are tabulated and graphed. 24 ref.

1711 Reaction Temperatures Between Refractories. L. A. McGill and J. Spotts McDowell. *American Ceramic Society Bulletin*, Dec. 1951, p. 425-431.

Presents results of investigations made since 1934 on the above. Phase diagrams, tabulated data, and photographs.

1712* Air Entrainment and Resistance to Freezing and Thawing. E. W. Scripture, Jr., S. W. Benedict, and F. J. Litwinowicz. *Journal of the American Concrete Institute*, v. 23, Dec. 1951; *A.C.I. Proceedings*, v. 48, 1951, p. 297-308.

Investigations were undertaken to determine the suitability of various air-entraining agents for use in concrete, the relative effects of slow and rapid cycles of freezing and thawing, and the optimum range of air contents for concrete. With normal air-entraining agents, resistance to freezing and thawing varies mainly with the air content, not with the particular agent used. A rapid freezing and thawing cycle is considerably more destructive than a slow cycle, and abnormal results appear to be produced in some cases by a very fast cycle.

1713 Tests of Fine Aggregate for Organic Impurities and Compressive Strength in Mortars. Bryant Mather. *ASTM Bulletin*, Dec. 1951, p. 35-43.

Presents results of a study of methods used in testing fine aggregate for concrete to determine the presence of organic impurities and the relations between results of color tests, mortar-strength tests, and certain other factors such as soundness and grading. Data are given on 294 samples of fine aggregate.

1714 Effect of Certain Variables on Results of Standard Mortar Test of Fine Aggregate. Delmar L. Bloem. *ASTM Bulletin*, Dec. 1951, p. 44-46.

The data presented suggest that ASTM Method C-87 does not provide adequately for isolation of the principal variable which it is intended to measure, that is, effect of organic impurities on strength of mortar. A wide range in relative strengths of mortars was found to result from the use of different brands of cement.

1715 A "Color Index" for Floor Tile Resins. B. A. Reeves. *ASTM Bulletin*, Dec. 1951, p. 62-64.

Describes use of a photoelectric photometer for color evaluation of the above. Color-test data on paracumarone-indene resins of several grades from various manufacturers are shown.

1716* Methods for Testing for Enamel Coating Discontinuities. Stanley C. Orr. *Better Enameling*, v. 22, Dec. 1951, p. 16-19, 31.

Presents a compilation of procedures and equipment in common use. In general these tests are based upon the fact that a continuous enamel layer possesses excellent electrical insulating properties.

1717 Proper Die Lubricant Makes Extruding Easier. *Brick & Clay Record*, v. 119, Dec. 1951, p. 59, 61.

Presents a discussion of the newer die-lubricating compounds used to extrude clay products. Advantages as compared with older materials are discussed.

1718 Application of the $CaO—Al_2O_3—SiO_2$ Ternary System to Brick-Slag Reactions. W. F. Ford and J. White. *Transactions of the British Ceramic Society*, v. 50, Nov. 1951, p. 461-505.

Shows that the indications of the ternary diagram can be correlated with the results of practical slag tests wherein there is an approach to equilibrium conditions. It was found that the amount and viscosity of the ternary eutectic liquid formed is the major factor influencing softening behavior. Practical applications of this fact were suggested and an outline of the "ideal" type of fusion-point curve formulated. Diagrams, graphs, and tables. 10 ref.

1719 The Determination of the Pyroplastic Deformation in the Firing of Ceramic Bodies. I. C. McDowall and W. Vose. *Transactions of the British Ceramic Society*, v. 50, Nov. 1951, p. 506-516.

Discusses various methods used for the above.

1720 New Techniques for New Approaches to Cement Chemistry. Fred Ordway and Terry F. Newkirk. *Ceramic Age*, v. 58, Nov. 1951, p. 28-31.

Reviews some of the studies which have been made of the structure of portland cement. 11 ref.

1721 Ceramic Materials; A Complete Directory. *Ceramic Industry*, v. 58, Jan. 1952, p. 87-89, 91-92, 95-96, 99-100, 103-104, 107-108, 111-112, 115-116, 119-120, 123-124, 127-128, 131-132, 135-136, 139-140, 143-144, 147-148, 151-152, 155-156, 159-160, 163-164.

Presents detailed information on all known ceramic materials—their formulas, physical characteristics, properties, and uses in enamel, glass, and pottery.

1722 Ceramic Batches; A Representative Collection. *Ceramic Industry*, v. 58, Jan. 952, p. 166-179.

Latest batch recipes used in the ceramic industry to prepare a wide variety of enamels, glasses, pottery bodies and glazes.

1723* Body Preparation by Dry Mix Methods. *Ceramics*, v. 3, Nov. 1951, p. 456-460, 462.

Discusses advantages and disadvantages of the above.

1724 How to Scale Up a Rotary Kiln. J. A. Luethge. *Chemical Engineering*, v. 58, Dec. 1951, p. 151-156.

Presents 4 short-cut formulas designed for fuel economy, derived from a surface-area concept. They can be used to find the right dimensions for equivalent fuel usage, the right diameter for equivalent dust pickup, the proper speed of rotation, and a fuel approximation for extra-large kilns. Applicable to cement, lime, and other kilns. 12 ref.

1725* The Rheology of Building Materials. A. G. Ward. *Chemistry & Industry*, Nov. 24, 1951, p. 1026-1028.

Deals mainly with recent work on the rheology of building mastics. Discusses subjective judgment and laboratory-scale studies.

1726* Some Possibilities of Scientific Control in the Heavy Clay Industries. G. H. Whiting. *Claycraft*, v. 25, Dec. 1951, p. 154-158. (A condensation.)

Discusses the above with special reference to control of clay, machines, kilns, and the finished product.

1727* The Production and Distribution of Steam With Special Reference to the Ceramic Industry. E. Griffiths. *Claycraft*, v. 25, Dec. 1951, p. 159-161. (A condensation.)

Discusses the need in the ceramic industry for good layout and operation of boiler plants.

1728* Some Observations on the Preparation and Processing of Clays in the Heavy Clay Industry. F. Stanley Jones. *Claycraft*, v. 25, Dec. 1951, p. 161. (A condensation.)

Discusses methods of preparation and processing of clay in the Heavy Clay Industries. The practice of the weathering of clays is considered and the question raised "Is it really necessary?" or could mechanical disintergration achieve the same results.

1729* Design and Economy of Electrically Heated Ceramic Ovens. I. Horowitz. *Berichte der Deutschen Keramischen Gesellschaft e.V. und des Vereins Deutscher Emailfachleute e.V.*, v. 28, Sept. 1951, p. 455-482.

Discussion of factors that affect efficiency and economy of intermittently and continuously operated furnaces includes numerous illustrations, graphs, and tables.

1730* Stresses in Enameled Cast Iron. Alfred Thürmer. *Berichte der Deutschen Keramischen Gesellschaft e.V. und des Vereins Deutscher Emailfachleute e.V.*, v. 28, Sept. 1951, p. 504-511.

Discusses methods of computing thermal expansion of enamels and shows that satisfactory enameling requires consideration not only of composition and treatment of enamel, but also of shape and condition of the casting. Data are tabulated.

1731 Solubility of Refractory Mill Additions in Fired Ground Coat Enamels. James H. Healy. *Finish*, v. 9, Jan. 1952, p. 27-30.

Solubility of clay, Keystone feldspar, and nepheline syenite in typical commercial ground-coat frits was studied with the

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Geiger-counter X-ray spectrometer. Crystalline alpha quartz and feldspars were present in normally fired ground coats. X-ray analysis showed that the relative quantities of crystalline phase present decreased with an increase in firing temperature and were not appreciably affected by an increase in firing time.

1732 Coloring Oxides in Vitreous Enamels. W. Ball. *Foundry Trade Journal*, v. 91, Dec. 6, 1951, p. 651-654.

Surveys the above. Considers such factors as methods of firing, frit composition, color control, and matching of components.

1733 Influence of Furnace Atmosphere Upon Glass Stability. W. H. Manring. *Glass Industry*, v. 32, Dec. 1951, p. 603-605.

Presents a practical picture of the role of furnace atmosphere on glass stability in terms of finding rates as they are influenced by oxidation-reduction influences. It is the writer's opinion that a more detailed study of these influences would greatly improve melting rates and enable even heavier furnace pulls. Many other factors, such as batch preparation, charging, and matching of grain sizes are also discussed.

1734 Effects of High-Energy Radiation Upon Glasses. Kurt O. Otley. *Glass Industry*, Jan. 1952, p. 24-27.

Reviews literature on the effect of higher energy radiation upon glass and incorporates an outline of experimental work at Penna. State College. Discusses chemical and physical aspects of discoloration. 42 ref.

1735 Glass-Research in the Electric Lamp and Valve Industry. J. E. Stanworth. *Industrial Chemist and Chemical Manufacturer*, v. 27, Dec. 1951, p. 536-540.

Describes the development of glasses with special physical properties. Glasses considered are the phosphate, borate, aluminate, aluminosilicate, and complex silicate glasses. Data are tabulated. 13 ref.

1736 The Drying Characteristics of China Clay. D. M. Newitt and M. Coleman. *Industrial Chemist and Chemical Manufacturer*, v. 27, Dec. 1951, p. 555-559. (A condensation.)

Examines the drying characteristics of a more complex fine solid, china clay, and shows that the concept of absorbed water affords a satisfactory explanation of certain aspects of the mechanism of moisture migration during the drying of this material.

1737 The Behavior of Graphite Under Alternating Stress. Leon Green, Jr. *Journal of Applied Mechanics*, v. 18 (*Transactions of the American Society of Mechanical Engineers*, v. 73), Dec. 1951, p. 345-348.

Discusses an investigation of the fatigue properties of grade AUF[4] extruded polycrystalline graphite to evaluate the suitability of the material for high-temperature structural applications. 10 ref.

1738* Formation and Structure of Silica Gel. (In German. W. A. Weyl and E. A. Hauser. *Kolloid Zeitschrift*, v. 124, Nov. 1951, p. 72-76.

Presents results of a study of the polymerization of silica, of the properties of $SiO_2 \cdot H_2O$ and of the problem of glass corrosion.

1739 Vitreous Enamel Finishes for Aluminum; A Review of Recent Investigations. J. C. Bailey. *Light Metals*, v. 14, Dec. 1951, p. 647-656.

Discusses the properties required in an enamel finish on Al. Data on the influence of alloy composition and pretreatment on appearance and adhesion of lead-free enamel are tabulated and discussed. Results of performance tests on some enamels are given.

1740* Comparative Tests on the Applicability of Materials for Pouring Ladles. (In Italian.) Giuseppe Ziliani and Giuseppe Grungo. *Metallurgia Italiana*, v. 43, Nov. 1951, p. 476-481; disc., p. 481-482.

Because of the presence of free quartz in standard refractories, resulting in their low chemical resistance to molten steel, use of chamotte refractories is proposed. When steel contains a normal content of Mn, refractories with a low content of Al may be used with good results.

1741 Ceramic Coating Increases Life of Engine Exhausts. Wilson G. Hubbell. *Metal Progress*, v. 60, Dec. 1951, p. 87-91, 166.

Tests were made on the following materials: 19-9DL stainless steel with ceramic coatings on both interior and exterior; 19-9DL stainless steel and ceramic coatings on interior only; 19-9DL stainless steel, uncoated (3 control headers); 17-14 Cu-Mo steel, uncoated, modified type 310, uncoated, type 310 stainless steel with Cb, uncoated; Inconel X, uncoated; N-155, uncoated; and Hastelloy C, uncoated. Micrographs.

1742 Effect of SO_3 on the Alkali Compounds of Portland Cement Clinker. Terry F. Newkirk. *Journal of Research of the National Bureau of Standards*, v. 47, Nov. 1951, p. 349-356.

Results of investigation show that the compound $Na_2O \cdot 8CaO \cdot 3Al_2O_3$, which is known to be one of the forms in which Na_2O may occur in portland cement clinker, is unstable at clinkering temperatures in the presence of SO_3. This compound reacts with SO_3 to form Na_2SO_4 and $3CaO \cdot Al_2O_3$. Any excess of Na_2O will remain as $Na_2O \cdot 8CaO \cdot 3Al_2O_3$, become a constituent of the clinker glass, or enter into solid solution with one of the other clinker components. Equations are developed for calculating the approximate composition of the alkali sulfate and the potential phase composition of clinker-type mixtures having various R_2O-SO_3 ratios.

1743 Effect of Exposure to Soils on the Properties of Asbestos-Cement Pipe. Irving A. Denison and Melvin Romanoff. *Journal of Research of the National Bureau of Standards*, v. 47, Nov. 1951, p. 367-379.

Summarizes results of study made on 2 varieties of asbestos-cement pipe involving exposure to 15 different soils for periods up to 11 yrs. The soils range from well-aerated types deficient in water soluble salts to very poorly aerated ones containing high concentrations of soluble material. Effects of exposure on mechanical and physical properties are indicated by measurements of hydrostatic bursting pressure, crushing strength, water absorption, apparent specific gravity, and by observations of surface condition of the specimens removed. 10 ref.

1744* Recent Technical Progress in Basic Steel Furnace Refractories. Part III. F. I. Cordwell. *Refractories Journal*, Nov. 1951, p. 467-475.

Discusses the chemical composition of dolomite. Describes work done to obtain a dolomite inert to the action of the humidity of the air and to recarbonation.

1745 Boron Carbide Bricks for Neutron Absorption. Charles Sheer and Jay Tittman. *Review of Scientific Instruments*, v. 22, Nov. 1951, p. 837-838.

A method was developed for compacting B_4C powder into small bricks of reasonable mechanical strength. These bricks were used for the lining of a slow neutron collimator and scattering chamber. A semi-quantitative evaluation of the effectiveness of these bricks as a neutron sink is given.

1746* Sand Mortar Strength Influenced Most By Grading. E. L. Howard. *Rock Products*, v. 54, Dec. 1951, p. 106-108.

Gives procedure and results of mortar tests for sands. States that strength varies according to properties of different sands. Data are graphed and tabulated.

1747* Mechanics of Corrosion of Concrete Sewers by Hydrogen Sulfide. C. D. Parker. *Sewage and Industrial Wastes*, v. 23, Dec. 1951, p. 1477-1485.

An assessment of present knowledge on the above. Serves as a background for discussion concerning the fundamental reasons for the effectiveness of various remedial measures. 10 ref.

1748* New Glasses for the Construction of Sodium Vapour Discharge Lamps. A. E. Dale and J. E. Stanworth. *Journal of the Society of Glass Technology*, v. 35, Aug. 1951, p. 185-192.

Phosphate glasses were made with low thermal expansion coefficients and excellent resistance to attack by sodium vapor. Alumino-borophosphate glasses, containing approximately 20% divalent oxides, were made which matched the borosilicate glasses of thermal-expansion coefficient approximately 50×10^{-7}. Cased tubing was drawn satisfactorily from one such glass and made into sodium-vapor discharge lamps having excellent lumen maintenance. Finally, trial melts on a 50-lb. scale were made.

1749* The Porosity of Tank Blocks; Its Measurement and Variation. H. Whittaker and E. Seddon. *Journal of the Society of Glass Technology*, v. 35, Aug. 1951, p. 193-204; disc., p. 204-205.

The need for a means of checking the quality, and of assessing the likely performance in service, of large tank blocks in glass furnaces, before such blocks are put into use, is discussed. Describes quantitative measurement of the porosity of tank blocks, by a simple, rapid, nondestructive method. Results of such porosity measurements, made on a very large number of tank blocks, are given.

1750* Density Changes in Fused Silica. R. W. Douglas and J. O. Isard. *Journal of the Society of Glass Technology*, v. 35, Aug. 1951, p. 206-225.

Above density changes at 1000-1500° were studied. The equilibrium density curve was determined and time taken to reach equilibrium found for various temperatures. Gives preliminary results on measurements of volume of fused silica as a function of pressure in addition to time and temperature.

1751* The Solubility of Fluorides in Glass. Part II. R. J. Callow. *Journal of the Society of Glass Technology*, v. 35, Aug. 1951, p. 226-229.

The work of J. W. Ryde on the scattering of light by opal glasses offers an easy and hitherto unexploited method of following the process of precipitation in a vitreous medium, where the rate is sufficiently slow for the progress of nucleation and crystal growth to be followed. This method enables an estimate to be made of the amount of crystalline material in an opal glass, and hence the amount of fluorine present in the vitreous phase.

1752* The Use of Electronic Devices in the Glass Industry. W. J. R. Merren. *Journal of the Society of Glass Technology*, v. 35, Aug. 1951, p. 230-240.

Valuable features, applications, and further uses of electronic methods in the glass industry are summarized. The uses of PbS, PbSe, and PbTe cells, and of thermopiles and bolometers, all in conjunction with suitable electronic equipment, are illustrated.

1753* Castability of Fuller's Earths. (In German.) Karl Menzl. *Sprechsaal für Keramik; Glas; Email*, v. 84, Nov. 5, 1951, p. 436-437.

The poor castability of Fuller's earths, as compared to kaolins, is shown to be caused by size and shape of their molecules. Properties which influence castability are discussed. Includes two diagrams.

1754* Graphite Plugs for Ingot-Mold Bottoms. (In German.) Erich Boeckers. *Stahl und Eisen*, v. 71, Nov. 22, 1951, p. 1314-1316.

Surveys results of American and German investigations. It is shown that completely graphitized material is superior. Avoidance of formation of refractory inclusions is discussed.

1755* Remarks on Progress in Annealing and Tempering Theories. (In French.) Paul Acloque. *Verres et Réfractaires*, v. 5, Oct. 1951, p. 247-260.

Discusses internal stresses in rapidly cooled glass and their origin, creep in glass, pre-existing stresses in annealing or tempering of plate glass, and the relationship between structural and mechanical tempering.

1756* Reactions That Occur While Melting Glass With Na_2SO_4. III. Theoretical Computation of Equilibria Between Molten Na-Ca Silicates and the Sulfate "Gall" at 1200°C. (In German.) Ernst Kordes. *Zeitschrift für anorganische und allgemeine Chemie*, v. 266, Oct. 1951, p. 105-117.

See also:

1133 (carbon-brick blast-furnace linings)
1223 (ceramic welding fluxes)
1262 (metallizing of ceramics)
1278 (ceramic coatings for steel)
1283 (ceramic coatings for prevention of carbon adsorption)
1648 (refractories for flameless surface combustion)
1663 (Building Insulation—book)
1993 (electrical properties of ceramics)
2007 (vinyl coatings for concrete sewer pipes)
2080 (applications of $BaTiO_3$ crystals in ceramics)

23. LUBRICATION AND FRICTION

1757* Aero-Engine Oil Systems for Cold Climates. A Study of the Problems of Lubrication in Arctic Weather Conditions. N. Sharp. *Aircraft Engineering*, v. 23, Dec. 1951, p. 368-372.

Design and functioning of oil systems suitable for use in arctic weather are discussed in the light of experience gained in service and in testing several installations.

1758* Additives to Lubricating Oils. (In German.) A. Dierichs. *Chemische Technik*, v. 3, Sept. 1951, p. 263-268. Reviews the literature on functions and effects of different substances added to lubricating oils. Data are tabulated and graphed. 15 ref.

1759* Research on Friction and Wear. F. T. Barwell. *Engineering*, v. 172, Nov. 23, 1951, p. 649-651; Nov. 30, 1951, p. 697-699.

Outlines some of the steps taken in the laboratories of the Mechanical Engineering Research Organization to clarify the nature of wear and the manner in which it is reduced by the application of lubricants. Discusses the behavior of a bearing under the action of a load that varies either in magnitude or direction.

1760* Determining the Drop Point of Lubricating Oils According to the Ubbelohde Process. (In German.) R. A. H. Rothe and H. Hamker. *Erdöl und Kohle*, v. 4, Oct. 1951, p. 627-630.

Discusses method of determining above and various sources of error. The importance of treating the lubricating oils before determining their drop points is indicated and an air bath for this purpose is described. Data are tabulated.

1761* Analyzing Wheel Bearing Grease Complaints. D. G. Proudfoot. *Institute Spokesman*, v. 15, Dec. 1951, p. 8-15; disc., p. 16-17.

Surveys factors contributing to wheel-bearing failures. Lubrication is considered in detail. Illustrations.

1762 Grease Lubrication at High Speeds. *Lubrication*, v. 37, Dec. 1951, p. 141-148.

Presents results of a study of the above at speeds up to 35,000 rpm. Data on the effect of bearing design and manufacture on grease lubrication at high speeds are discussed. Results of endurance tests on bearings are tabulated.

1763 Modern Automotive Engine Oils. *Lubrication*, v. 38, Jan. 1952, p. 1-12.

Discusses the ever increasing use of addition agents in the above. Lubricating oils, in the prevention of contaminants or deposit forming materials from interfering with engine operation, preventing rusting of ferrous parts and corrosive wear, are surveyed.

1764 X-Ray and Electron-Diffraction Studies of Lubricating Surfaces. R. Brill. *Annals of the New York Academy of Sciences*, v. 53, art. 4, June 27, 1951, p. 824-835. (Q11 N49a.)

Reviews investigations on the structure of surface films for the case of boundary lubrication. Discusses the effect of stabilizing agents; and surveys papers concerning structure of polished metal surfaces. 29 ref.

Miscellaneous Publications

1765 Discrepancies Between Theoretical and Observed Behavior of Cyclically Loaded Bearings. R. W. Dayton, E. M. Simons, and F. A. Fend. National Advisory Committee for Aeronautics, Technical Note 2545, Nov. 1951, 27 pages. (TL570 Un3t.)

The above, for a cyclically loaded shaft rotating in a sleeve bearing, are analyzed. For constant loads rotating at ½ the frequency of shaft rotation, eccentricity ratios were found to be unity when kerosene was used to lubricate the test bearing. This agrees with theoretical predictions. However, when SAE-10 oil was used, eccentricity ratios were reduced as shaft speed increased. Refinements of test conditions resulted in observed eccentricity ratios closer to the theoretically predicted value of unity. Apparatus is described and illustrated; results are charted.

23. *Lubrication and Friction*

1766 Recent Developments in Full Fluid Lubrication. J. T. Burwell. *Annals of the New York Academy of Sciences*, v. 53, art. 4, June 27, 1951, p. 759-778. (Q11 N49a.)

Discusses the above, covering both hydrodynamic and hydrostatic lubrication. Includes schematic diagrams. 31 ref.

1767 Fundamental Mechanical Aspects of Thin-Film Lubrication. Harmen Blok. *Annals of the New York Academy of Sciences*, v. 53, art. 4, June 27, 1951, p. 779-804. (Q11 N49a.)

Gives the results of a correlational study of experimental and theoretical evidence on the above. The main theme is the explanation of "oiliness." A supplementary theme is exploration of the limits inherent in the hydrodynamic load-carrying capacity of oil films. 47 ref.

1768 The Influence of Surface Films on the Friction, Adhesion, and Surface Damage of Solids. F. P. Bowden. *Annals of the New York Academy of Sciences*, v. 53, art. 4, June 27, 1951, p. 805-823. (Q11 N49a.)

Reviews some recent experimental investigations on the part played by surface films in the friction and adhesion of solids. Discusses the bearing of these results on the theory of friction. 16 ref.

1769 Surface Chemical Phenomena in Lubrication. J. E. Brophy and W. A. Zisman. *Annals of the New York Academy of Sciences*, v. 53, art. 4, June 27, 1951, p. 836-861. (Q11 N49a.)

Discusses structure and mechanical properties of monolayers of amphipathic molecules adsorbed on metals; and surface chemical reactions of polar compounds with common metals. Data for specific compounds adsorbed on different metals and metal powders are presented and discussed. Rust-inhibitive properties are also considered. 4-ball-tester wear curves for steel on steel using different lubricants are also presented.

1770 Physically and Chemically Adsorbed Films in the Lubrication of Graphite Sliding Contacts. Robert H. Savage. *Annals of the New York Academy of Science*, v. 53, art. 4, June 27, 1951, p. 862-869. (Q11 N49a.)

Discusses the part played by adsorbed films in the above, and shows that the total interfacial cohesive force is sufficient to cause fragmentation. Alleviation was effected by lubrication of the graphite by water vapor in a H_2 atmosphere. Edge atoms were H_2-coated and therefore hydrophobic. 14 ref.

1771 Viscosity and Molecular Structure. A. Bondi. *Annals of the New York Academy of Science*, v. 53, art. 4, June 27, 1951, p. 870-905. (Q11 N49a.)

Discusses the basic relations between molecular structure, intermolecular forces, and viscosity in the light of the present state of the theory. Data are tabulated and graphed for a wide variety of organic compounds. Utilization in development of lubricants is discussed. 88 ref.

1772 Measurement of the Incremental Friction Coefficient of Several Homologous Series of Straight-Chain Hydrocarbon Compounds. S. F. Murray and J. T. Burwell. *Annals of the New York Academy of Science*, v. 53, art. 4, June 27, 1951, p. 906-918. (Q11 N49a.)

Above coefficient was measured as a function of rotation of one low-carbon steel cylinder against another one for a number of straight-chain polar hydrocarbons, which included alcohols, acids, amines, and two esters. 5 of the alcohols were also tested using 24S-T Al-alloy cylinders. Results are charted and discussed. 15 ref.

1773 The Fine Structure of Lubricating Greases. Bruce B. Farrington. *Annals of the New York Academy of Sciences*, v. 53, art. 4, June 27, 1951, p. 979-994. (Q11 N49a.)

Discusses the size, shape, and general properties of dispersed solid thickeners; gives methods of determining structure, and effect of grease structure on physical properties. Illustrated.

Books

1774 The Fundamental Aspects of Lubrications. A. O. Beeck, chairman. *Annals of the New York Academy of Sciences*, v. 53, art. 4, June 27, 1951, p. 753-994. (Q11N49a.)

A series of papers presented by the Section of Physics and Chemistry on the above. Individual papers are separately abstracted.

See also:
1202 (study of e.p. lubricants)
1397 (wear of lubricated metal bearings)

24. DESIGN

1775* Some Unknowns in Gear Design. H. E. Merritt. *Engineering*, v. 172, Dec. 7, 1951, p. 734-735; Dec. 14, 1951, disc., p. 763-764.

Considers various factors connecting the fundamentals and basic research, and their application in industry.

1776 Recent Progress in the Plastic Methods of Structural Analysis. P. S. Symonds and B. G. Neal. *Journal of the Franklin Institute*, v. 252, Dec. 1951, p. 469-492.

The techniques described in a previous article are further exemplified by indicating solutions for a rectangular building frame, a Vierendeel girder, and a shed-type portal frame. A method for estimating deflections of a frame just as the collapse load is attained is then described, with some indications as to its reliability. 19 ref.

1777 Power Transmission Through Flexible Couplings. John E. Hyler. *Iron Age*, v. 169, Jan. 10, 1952, p. 77-80.

Discusses the use of couplings for various misalignment problems in machinery. Illustrated.

1778 On the Stability of Plates Reinforced by Longitudinal Ribs. J. M. Klitchieff. *Journal of Applied Mechanics*, v. 18 (*Transactions of the American Society of Mechanical Engineers*, v. 73), Dec. 1951, p. 364-366.

Mathematical treatment of the above. Discusses 2 numerical examples of stiffenings used in ship design.

1779 On the Inextensional Theory of Deformation of a Right Circular Cylindrical Shell. R. M. Hermes. *Journal of Applied Mechanics*, v. 18 (*Transactions of the American Society of Mechanical Engineers*, v. 73), Dec. 1951, p. 341-344.

The inextensional theory of bending of shells is considered. By the method of superposition, the known solution is extended to include two cases which can easily be investigated experimentally. Experimental results are compared with the theoretical solution, indicating the degree of approximation involved in the use of the inextensional theory.

1780 A General Method of Calculating the M_{MAX} Diagram in Plastic Bending of Beams. Aris Phillips. *Journal of Applied Mechanics*, v. 18 (*Transactions of the American Society of Mechanical Engineers*, v. 73), Dec. 1951, p. 353-358.

Discussion and mathematical treatise of a new method for finding the above curve in the case of symmetrical pure bending of bars in plasticity. Graphical construction. 13 ref.

1781 Bending of Thin Ring-Sector Plates. L. I. Deverall and C. J. Thorne. *Journal of Applied Mechanics*, v. 18 (*Transactions of the American Society of Mechanical Engineers*, v. 73), Dec. 1951, p. 359-363.

General expressions for the deflection of plates, whose plan form is a sector of a circular ring, are given for cases in which the straight edges have arbitrary but given deflection and bending moment. Solutions are given for all combinations of physically important edge conditions on the two circular edges. Sectors of circular plates are included as special cases. 10 ref.

1782 On Symmetrical Strain in Solids of Revolution in Spherical Coordinates. Chih-Bing Ling and Kuo-Liang Yang. *Journal of Applied Mechanics*, v. 18 (*Transactions of the American Society of Mechanical Engineers*, v. 73), Dec. 1951, p. 367-370.

Presentation of expressions applied to find the stresses in a large tension member having a spherical cavity.

1783 The Safety Factor of an Elastic-Plastic Body in Plane Strain. D. C. Drucker, H. J. Greenberg, and W. Prager. *Journal of Applied Mechanics*, v. 18 (*Transactions of the American Society of Mechanical Engineers*, v. 73), Dec. 1951, p. 371-378.

Extremum principles are established for the safety factor of an elastic-plastic body made of a Prandtl-Reuss material and sub-

jected to given surface tractions under conditions of plane strain. Establishes bounds for the safety factor by the joint use of these principles. 14 ref.

1784 Critical Loads on Variable-Section Columns in the Elastic Range. Gordon Silver. *Journal of Applied Mechanics*, v. 18 (*Transactions of the American Society of Mechanical Engineers*, v. 73), Dec. 1951, p. 414-420.

Presents a practical method for calculating critical loads on columns of various types, using numerical integration.

1785 Spiral-Wound Gaskets on Flanged Joints. W. W. Boyd. *Petroleum Refiner*, v. 30, Dec. 1951, p. 120-123.

Describes a spiral-wound gasket developed for temperatures up to 1800°F. and high pressures. From a design standpoint, this type of gasket offers the advantage of low seating stress, low bolt stress, and resiliency. Application of these gaskets takes into consideration the type of joint, pipe size and flange designs, as well as operating conditions.

1786* Determination of Load-Bearing Capacity of Thin-Walled Structures, Including Calculations of the Strengthening of the Materials. R. A. Mezhlumian. *Prikladnaia Matematika i Mekhanika*, v. 15, Mar.-Apr. 1951, p. 175-182.

The stress state in thin-walled rods and cylindrical shells is treated theoretically.

1787* The Connection Between Stress and Deformation in Nonlinear Elastic Media. V. V. Novozhilov. *Prikladnaia Matematika i Mekhanika*, v. 15, Mar.-Apr. 1951, p. 183-194.

The relation of stress and deformation in materials that do not obey Hookes' Law is treated theoretically.

1788* Stability of Plane Forms of Bending Beyond the Elastic Limit. L. M. Hachanov. *Prikladnaia Matematika i Mekhanika*, v. 15, Mar.-Apr. 1951, p. 195-206.

The theory of small elastic plastic deformations is used to calculate the above. Results are tabulated and charted.

1789* Bending of Circular Plates by Concentrated Forces. M. M. Fridman. *Prikladnaia Matematika i Mekhanika*, v. 15, Mar.-Apr. 1951, p. 258-260.

The bending of thin, circular isotropic plates by loads applied at points on the plane surface and at points around the edge is treated mathematically.

1790 Bending Roll Design Analysis. E. A. Randich. *Product Engineering*, v. 23, Jan. 1952, p. 133-135.

Presents method for calculating data needed for the detail design of pyramid-type bending rolls. Forces acting on rolls are analyzed and equations derived for diameters of top and bottom rolls to curve plate of different widths and thicknesses.

1791 Basic Design for Small Part Stampings. D. A. Rodgers. *Product Engineering*, v. 23, Jan. 1952, p. 162-165.

Describes recommended practice for the design of simple stampings, including design for forming and bending, relief notches for right angle bends, and tolerances on mating. Numerous diagrams.

1792 Low Cost Methods of Coupling Small Diameter Shafts. *Product Engineering*, v. 23, Jan. 1952, p. 184-185.

Diagrams show 16 types of low-cost couplings, including flexible and non-flexible types. Most are for small-diameter, lightly loaded shafts, but a few of them can also be adapted to heavy-duty shafts.

1793 Multiple Pressure Hydraulic System. H. L. Stewart. *Product Engineering*, v. 23, Jan. 1952, p. 186-191.

Described and diagrammed.

1794* Energy Theorems and Critical Load Approximations in the General Theory of Elastic Stability. J. N. Goodier and H. J. Plass. *Quarterly of Applied Mathematics*, v. 9, Jan. 1952, p. 371-380.

Theoretical analysis and mathematical treatment of the above.

1795* Extended Limit Design Theorems for Continuous Media. D. C. Drucker, W. Prager, and H. J. Greenberg. *Quarterly of Applied Mathematics*, v. 9, Jan. 1952, p. 381-389.

Earlier results on safe loads for a Prandtl-Reuss material subject to surface tractions or displacements which increase in ratio are extended to any perfectly plastic material and any history of loading.

1796* Results of Experiments on Stress Distribution in Disks or Cylinders With Eccentric Holes or With One Central Hole Subjected to Internal Pressure. (In Italian.) Giuseppe Manzella. *Tecnica Italiana*, new ser., v. 6, Sept.-Oct. 1951, p. 359-369.

Presents results of a photoelastic study of the above. Includes diagrams, graphs, and tables.

1797* Convection Ovens in TV-Tube Production. N. E. Bertl. *Tele-Vision Engineering*, v. 2, Dec. 1951, p. 12-15.

Describes convection gas-heating technique developed for 29-ft. diam. circular screen baker and 27½-ft. exhaust ovens, which provide proper control of temperature in each of 8 zones without need for separating baffles between zones. Method also serves to eliminate need for indexed forward travel and difficulties inherent in stop-and-start operation.

Miscellaneous Publications

1798 Torsion and Bending of Prismatic Rods of Hollow Rectangular Sections. B. L. Abramyan. National Advisory Committee for Aeronautics, Technical Memorandum 1319, Nov. 1951, 24 pages. (Translated from *Prikladnaia Matematika i Mekhanika*, v. 14, no. 3, 1950, p. 265-276.) (TL570 Un3tm.)

A mathematical treatment.

1799 Wind-Tunnel Investigation of Six Shielded Total-Pressure Tubes at High Angles of Attack: Subsonic Speeds. Walter R. Russell, William Gracey, William Letko, and Paul G. Fournier, National Advisory Committee for Aeronautics, Technical Note 2530, Nov. 1951, 25 pages. (TL570 Un3t)

Gives results of the above investigation conducted for the purpose of providing fixed or rigid total-pressure tubes for use on high-performance airplanes capable of maneuvering to high angles of attack. Tests cover Mach-number range 0.26-0.95.

1800 Critical Combinations of Bending, Shear, and Transverse Compressive Stresses for Buckling of Infinitely Long Flat Plates. Aldie E. Johnson, Jr., and Kenneth P. Buchert. National Advisory Committee for Aeronautics, Technical Note 2536, Dec. 1951, 40 pages. (TL570 Un3t)

Three-dimensional interaction surfaces are presented for the above. Surfaces are presented for 2 sets of edge conditions: both edges simply supported and lower edge simply supported, upper edge clamped. Present results are in good agreement with data for one-load and two-load limiting cases previously published. Tables and graphs.

1801 Deflections of a Simply Supported Rectangular Sandwich Plate Subjected to Transverse Loads. Kuo Tai Yen, Sadettin Gunturkun, and Frederick V. Pohle. National Advisory Committee for Aeronautics, Technical Note 2581, Dec. 1951, 39 pages. (TL570 Un3t)

The differential equations of the bending of sandwich plates were integrated to obtain the deflections when the four edges of the plate are simply supported and the loading consists of either a uniformly distributed transverse load or a concentrated load applied at the center of the panel. The deflection patterns are shown in diagrams and the maximum deflection of the plate is presented in a number of graphs.

Books

1802 Machine Drawing. Deane Lent. 523 pages. 1951. Prentice-Hall, New York. (TJ230 L54m)

Discusses the design, detail, and assembly phases of machine production. Numerous illustrations, diagrams, and charts.

See also:
1403 ("Theory of Perfectly Plastic Solids"—book)
1585 (die design for thermosetting laminates)
2231 (electrical-switch design for icing conditions)
2294 (Western Chemical industry—1951)

25. CHEMICAL TECHNOLOGY

1803 The Catalytic Activity of Metals Produced by the Reduction of Salts in Liquid Ammonia. II. Nickel. George W. Watt, Wilbur F. Roper, and Sidney G. Parker. *Journal of*

25. *Chemical Technology*

the American Chemical Society, v. 73, Dec. 1951, p. 5791-5793.
Presents results of experiments on the preparation and properties of nickel hydrogenation catalysts formed by the reduction of $NiBr_2$ with K in liquid NH_3.

1804* Patra Research. *American Ink Maker*, v. 30, Jan. 1952, p. 29, 65, 67.
Presents an outline of the work done at Printing, Packaging and Allied Trades Research Assn. in England on printing-ink research during the past year.

1805* Radioactive Isotopes in Industry. 2. Petroleum. *Atomics*, v. 2, Dec. 1951, p. 329-340.
Discusses the use of radioactive isotopes in refinery equipment, refining and synthesis investigations, and by-product studies. Data are graphed. 20 ref.

1806* Contribution to the Low-Temperature Distillation of Coal. (In German.) Gerhard Lorenzen. *Brennstoff-Chemie*, v. 32, Nov. 14, 1951, p. 324-331.
Discusses the possibility of countries with meager oil resources producing oil from coal. Graphs, diagrams, and photographs.

1807* Experiences With the Koppers' Cyclic Gas Process. (In German.) F. Bieger. *Brennstoff-Chemie*, v. 32, Nov. 14, 1951, p. 331-339.
Describes above process of producing fuels and other hydrocarbons from coal; and shows that great fluctuations in efficiency are caused by too high moisture content of the briquettes. Three methods of eliminating this difficulty are proposed. The work was done in 1944, but not previously reported. Includes diagrams, graphs, and tables.

1808 Alcohol for Industry. *Canadian Chemical Processing*, v. 35, Dec. 1951, p. 1004, 1006, 1008, 1010-1011.
Surveys the above. Methods used in production of alcohols are discussed.

1809 Industrial Vinyl Chloride; Royal Shell Process in Holland. *Chemical Age*, v. 65, Dec. 15, 1951, p. 801-803. (Based on paper by J. C. Vlugter and others, *Chemica e l'Industria*, v. 33, no. 10, 1951, p. 613-619.)
Description of above process includes flow diagrams.

1810 Process Control by Mass Spectrometer. Charles F. Robinson. *Chemical Engineering*, v. 58, Dec. 1951, p. 136-137, 141.
Describes mass spectrometers modified for the continuous monitoring of complex gas mixtures. Diagrams.

1811 Catalysts. Choosing a Catalyst. H. Hoog. **Catalyst Manufacture.** (anon.). **Recent Applications.** (anon.). *Chemical Engineering*, v. 58, Dec. 1951, p. 157-168.
Surveys the above. Discusses requirements for a catalyst and various shapes necessary to suit process conditions. Presents various examples in which they have been applied.

1812 Fluorochemicals Go Commercial. *Chemical Engineering*, v. 58, Dec. 1951, p. 215-216, 219.
Describes the Simons process, a new electrochemical fluorination process. It consists of passing a current through a mixture of the organic starting material and liquid anhydrous HF in an electrolytic cell. Advantages are given.

1813 Coming in Selective Adsorption. *Chemical Engineering*, v. 58, Dec. 1951, p. 261-262.
Describes 3 new continuous adsorption processes. Two utilize flotation techniques and the third, a sink method.

1814 A Decade of Chemical Achievement. *Chemical and Engineering News*, v. 29, Dec. 24, 1951, p. 5435-5440.
Reviews results and progress of the government's 4 regional research laboratories established to find new uses for farm products.

1815 C & EN Annual Review of Developments in the Chemical and Process Industries. *Chemical and Engineering News*, v. 30, Jan. 7, 1952, p. 12-40.
Consists of the following articles: "1951 in the Chemical Industry," George W. Merck; "Foods and Nutrition," C. Glen King; "Rubber," John T. Cox, Jr.; "Textile Chemical Development," Milton Harris and A. M. Schwartz; "Petroleum Industry," R. W. Thomas and P. M. Arnold; "Plastics," E. E. McSweeney; "Foreign Trade," L. N. Markwood; "Synthetic Detergents," Foster Dee Snell; "Protective Coatings," Harry Burrell; "Metals Industry," I. E. Campbell; "Medicinal Chemistry," R. O. Roblin, Jr.; "Fertilizer Chemistry," F. S. Lodge; and "Agricultural Chemicals," Lea S. Hitchner. Selected reports are individually abstracted.

1816 Performance of Spinning Disk Atomizers. Part II. (Concluded.) C. R. Adler and W. R. Marshall, Jr. *Chemical Engineering Progress* (Engineering Section), v. 47, Dec. 1951, p. 601-607; disc., p. 607-608.
Results of experiments are tabulated, charted, illustrated, and discussed. 57 ref.

1817 Mass-Transfer Rates on Bubble Plates. Part II. Results for Large Trays. J. A. Gerster, W. E. Bonnet, and Irwin Hess. *Chemical Engineering Progress* (Engineering Section), v. 47, Dec. 1951, p. 621-627; disc., p. 627.
Concluding installment includes graphs, tables, and diagrams. 19 ref.

1818 Heat Transfer Between a Vertical Tube and a Fluidized Air-Solid Mixture. Willard M. Dow and Max Jakob. *Chemical Engineering Progress* (Engineering Section), v. 47, Dec. 1951, p. 637-648.
Transfer of heat from a vertical tube wall to fluidized beds of small solid particles was investigated experimentally in 2 and 3-in. diam. tubes. The fluidized mixture consists of particles of 3 different solids, Aerocat, pitch coke, and iron, suspended in an upward flowing stream of air. A heat-transfer mechanism was developed and used as a guide for dimensionless correlation of the experimental data for mechanically smooth, dense-phase fluidization.

1819 Solvent Drying. R. J. Mitchell. *Chemical Engineering Progress* (Engineering Section), v. 47, Dec. 1951, p. 649-653.
Describes a method for distillation of drying of solvent mixtures such as methyl ethyl ketone and benzene which are used in wax-manufacturing processes. A design procedure is included which employs a modification of the McCabe-Thiele graphical method. Operating data from a commercial drier are given. Integration of such a drier into the solvent-recovery system of a wax-deoiling plant is discussed. 22 ref.

1820 Iodine Tamed. *Chemical Week*, v. 69, Dec. 22, 1951, p. 19-20.
Discusses new combinations of iodine with surface-active agents which enhance germicidal activity, and reduce toxicity.

1821 Cane Wax Gain. *Chemical Week*, v. 69, Dec. 22, 1951, p. 23-24.
Describes a process developed by Australian scientists for refining crude sugar cane wax. It employs vacuum distillation and a chromic acid bleach instead of conventional solvent extraction.

1822* Air Force Search. *Chemical Week*, v. 70, Jan. 5, 1951, p. 24-25.
Discusses U. S. Air Force requirements for hydraulic fluid. These are much more severe than those of the Navy and commercial airlines.

1823 Benzene Behind the Iron Curtain. *Chemical Week*, v. 70, Jan. 12, 1952, p. 23-24, 26.
Tells how a Polish chemist, Joseph Winkler, designed a unit for the synthesis of benzene. Process involves 2 steps: alkanes are first cracked to olefins, which are then converted to benzene.

1824 Cation Custodians. *Chemical Week*, v. 70, Jan. 19, 1952, p. 39-40.
Discusses the utilization of ethylenediamine tetraacetic acid, its salts and derivatives as sequestering agents in the preparation of soaps, textiles, rubber, pharmaceuticals, cosmetics, etc.

1825* Hydrodynamics of Fluidized Particle Layers. (In German.) H. Trawinski. *Chemie-Ingenieur-Technik*, v. 23, Sept. 1951, p. 416-419.
Above is described as important to "fluidization" or "fluid-catalyst processes" for producing chemical reactions. Principles of research are discussed. Includes graphs and diagrams. 18 ref.

1826* The Importance of Oils Obtained by Direct Extraction From Paraffin-Base Topped Mineral Oils (Iso-Oils). (In German.) A. Dierichs. *Chemische Technik*, v. 3, Sept. 1951, p. 268-270.

Discusses methods of removing paraffins, aromatics, and olefins; also nature and advantages of the iso-process, and properties and uses of iso-oils and of the residue. Data are tabulated.

1827* New Economic Methods of Producing CO_2 and Dry Ice. (In German.) W. Opitz. *Chemische Technik*, v. 3, Oct. 1951, p. 303-306.

Proposed method utilizes both CO_2 and heat content of waste gases from coke ovens and city-gas plants. Apparatus for liquefying and solidifying CO_2 are described and illustrated. Data are tabulated.

1828* A Simple, Rapid Optical Method of Determining the Naphthalene Content of Wash Oil. (In German.) Siegfried Schubert. *Gas- und Wasserfach*, v. 92, Oct. 31, 1951, p. 277-278.

Describes a new process in which the crystallizing behavior of test sample is compared with that of a standard solution. A diagram illustrates the principle; data are tabulated.

1829* Recovery of Pure Sulphur From Spent Oxide. F. A. Burden and W. B. S. Newling. *Gas World*, v. 134, Dec. 22, 1951, p. 571-573.

Describes use of toluene extraction for the above. The hot extract solution contains nearly all the sulfur and tar originally in the oxide, and is filtered free of oxide fines. It was found that crystals of pure sulfur can be formed from the tarry solution by slow cooling with continuous stirring, particularly if the solution is not allowed to cool below about 40°C. 10 ref.

1830 The Physical Principles of Petroleum Refining. E. S. Sellers. *Industrial Chemist and Chemical Manufacturer*, v. 27, Dec. 1951, p. 531-535.

Discusses fundamental considerations underlying the design of fractionating columns and solvent-extraction processes. 19 ref..

1831 Lithium and Its Compounds; A Staff-Industry Collaboration Report. Rodney N. Hader, Richard L. Nielsen, and Myron G. Herre. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2636-2646.

Covers history and occurrence; derivation of Li_2CO_3 and other Li products from spodumene ores. Lists future plans. 26 ref.

1832 Instrumentation Symposium. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2694-2711.

A series of papers as follows: "Quality Control in the Process Industries," John G. Dobson; "Instrumentation for Boilerhouses and Oil Refineries," J. A. Pellettere; "Instrumentation in Radioactive Systems," C. A. Jansen, Jr.; "A Pneumatic Process Analog for Instruction and Research," Ernest F. Johnson, and "Instrument Engineer in Process Design," J. N. Nonamaker.

1833 Catalytic Air Oxidation of Higher Aromatics to Phthalic Anhydride. Corliss R. Kinney and Irving Pincus. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2880-2884.

Surveys the possibilities of producing phthalic anhydride by the catalytic air oxidation of certain higher aromatics and coal tar fractions. Gives results of experiments.

1834* The Effect of Humidity on Mould Growth on Constructional Materials. J. B. M. Coppock and E. D. Cookson. *Journal of the Science of Food and Agriculture*, v. 2, Dec. 1951, p. 534-537.

The above is discussed. It was found that at a relative humidity of 70% or less, mold growth is inhibited on bricks, wood, painted wood, and distempered surfaces. The physical properties of the substrate determine to a large extent the rate of mold growth at particular R. H. values. An apparent optimum humidity for growth was observed on certain of the materials examined.

1835* Variations in the Composition of Some Linolenic-Rich Seed Oils. T. P. Hilditch. *Journal of the Science of Food and Agriculture*, v. 2, Dec. 1951, p. 543-547.

Presents a literature survey on the above. Summarizes the fatty-acid compositions which have been found in all specimens of candlenut, rubber seed, linseed, and hemp seed oils. 14 ref.

1836* Factors in Waxed-Paper Sealing. George P. Mueller. *Modern Packaging*, v. 25, Dec. 1951, p. 125-129.

An examination of conditions affecting heat-seal strength, pointing toward closer control of quality. Experimental apparatus is described and illustrated; data are extensively charted.

1837* Predicting Film Durability. V. L. Simril and D. W. Flierl. *Modern Packaging*, v. 25, Dec. 1951, p. 130-134, 176, 178.

Discusses the use of test data obtained in the laboratory on single sheets of films and papers to predict the ability of packages to withstand the abuses received during shipping and incidental handling.

1838 Effect of Certain Nucleic Acid Constituents on the Growth of Some Higher Fungi. Nils Fries. *Nature*, v. 168, Dec. 15, 1951, p. 1045-1046.

Results are tabulated and discussed.

1839* Oil's Sulfur Boomlet. George Weber. *Oil and Gas Journal*, v. 50, Jan. 14, 1952, p. 61-64.

Reviews present status and future prospects for recovery of sulfur from petroleum. Table gives specific information on U. S. and foreign petroleum sulfur-recovery projects.

1840* Checking Heat-Exchanger Performance. C. H. Gilmour. *Oil and Gas Journal*, v. 50, Jan. 14, 1952, p. 99, 102-103, 105, 119, 121.

The method described is said to take much of the drudgery out of heat-exchanger calculations and also to be accurate. Nomograms and tables.

1841* Report on Operating the Rich-Oil Rectifier. Edward G. Ragatz. *Oil and Gas Journal*, v. 50, Jan. 14, 1952, p. 107, 109-111, 121-122.

Rich-oil rectifiers are desirable for high propane recoveries. Gives "know how" for various rectifier flow schemes, and details efficiency and control factors associated with their operation.

1842* New Petrochemicals Plant Producing Full Range of Products From Middle East Naphtha. H. E. Charlton. *Oil and Gas Journal*, v. 50, Dec. 20, 1951, p. 201-203, 328-329.

Discusses the above project which consists of an integrated group of plants for the separation, purification, and conversion of the products arising from the Catarole cracking process. Diagrammatic flow chart showing the manufacture of petrochemicals.

1843 The Process Control of Stand Oils During Cooling. G. H. Hutchinson. *Paint Manufacture*, v. 21, Dec. 1951, p. 437-443.

Describes methods of calculating the viscosity increases which take place during cooling, and predicting the "cooling down" viscosity of a stand oil for a particular final viscosity.

1844* The Microscope and Its Applications in the Papermaking and Printing Industries. Part VI. F. D. Armitage. *Paper Making and Paper Selling*, v. 70, Autumn 1951, p. 23-32.

Describes and illustrates methods used for cutting sections of paper for microscopical examination.

1845* A Study of the Structure of Paper by Means of "Soft" X-Rays. J. D. Pelgroms. *Paper Trade Journal*, v. 134, p. 25-26, 28, 30, 32.

Describes the above. X-ray photographs are presented.

1846* Phase Behaviour of Lubricating Greases. Thomas D. Smith. *Petroleum*, v. 15, Jan. 1952, p. 5-8.

Compares the behavior of greases with simpler binary or ternary systems and thereby deduces ideas concerning the phase nature of these more complex systems. Phase diagrams indicate range over which a grease will maintain a required texture. Reviews methods employed in phase studies and gives results obtained. 23 ref.

1847 Thermal Cracking. H. R. Linden. *Petroleum Processing*, v. 6, Dec. 1951, p.1389-1394, 1396.

Discusses the effects of process variables and feedstock properties on yields and compositions of the products. 15 ref.

25. *Chemical Technology*

1848 Fundamentals of Fluid Hydroforming. E. V. Murphree. *Petroleum Refiner*, v. 30, Dec. 1951, p. 97-101.

Presents the basic fundamentals of above catalytic petroleum refining process, its cost and its application.

1849 The Application of Fluid Hydroforming. Henry G. McGrath. *Petroleum Refiner*, v. 30, Dec. 1951, p. 102-108.

Presents the most recent results obtained in the operation of a fluid-hydroforming pilot plant. Experimental data are presented on the effect of temperature, pressure, tail-gas recycle, precatalytic thermal reforming, and the result of catalyst-life tests. Graphs and tables.

1850* The Mechanism of the Improvement of the Wet Strength of Paper by Polyethylenimine. Paul E. Trout. *Tappi*, v. 34, Dec. 1951, p. 539-544.

Presents results of an investigation on the above. Data are graphed and tabulated. 23 ref.

1851* Hardness, Blocking, and Cooling Curve Modulus of Paraffin Wax. John W. Padgett. *Tappi*, v. 34, Dec. 1951, p. 547-552.

A modified and improved consistometer for hardness determination of paraffin wax is described and the relationship between blocking and hardness illustrated. A new test, the cooling-curve modulus, is described and its relation in a general way to hardness and blocking shown.

1852* Spent Sulphite Liquor Studies I. Program of the Sulphite Pulp Manufacturers' Research League, Inc. Averill J. Wiley. **III. Laboratory and Commercial Trials of Spent Sulphite Liquor-Asphalt Emulsions for Briquetting of Coal.** A. J. Wiley, M. F. Kummer, C. R. Faulkender, and Bernard Van Camp. *Tappi*, v. 34, Dec. 1951, p. 553-560.

Presents evidence that good quality coal briquettes, high in strength and with satisfactory weathering resistance, can be made with use of spent sulphite liquor as a principal binder. Emulsions of the spent liquor with asphalt in proportions of 60 to 40 or 75 to 25 combine the advantage of each product alone and may give superior clean briquettes. Pilot development of commercial methods for use of this type binder is planned for the near future.

1853* The Mechanism of Fiber Bonding. W. S. Wilson. *Tappi*, v. 34, Dec. 1951, p. 561-566.

Data are given showing how wet strength, derived from dry heating, affects wet-break test. A theory to account for this wet strength is advanced. An extension of this theory is suggested to explain why a sheet of paper has strength. Stress-strain data and density vs. dry tensile data are given in support of the proposed theory that the strength of the paper bond is practically purely mechanical. Tables and graph.

1854* Fluid Separation With Permeable Plastics. C. B. Jahn and Donald M. Taylor. *World Oil*, v. 134, Jan. 1952, p. 155-158.

Among outstanding recent developments in the field of plastics is a highly permeable element that has proven to be a satisfactory fluid-separation medium. A theoretical analysis of the principles employed is presented. Applications include gas separation by diffusion or atmolysis, extraction of free water and hydrocarbons from gas streams, and separation of water-in-oil emulsions. Field test equipment is illustrated.

Miscellaneous Publications

1855 Studies on the Production of Strong Phosphoric Acid According to the Wet Anhydrite Process. Sven Nordengren. *Acta Polytechnica* (Chemistry Including Metallurgy Series), v. 2, no. 9, 1951, 11 pages. (T1 A81)

Discusses the above process giving experimental procedures, observations, and results. Data tabulated.

1856 Fluid Flow Through Packed and Fluidized Systems. M. Leva, M. Weintraub, M. Grummer, M. Pollchik, and H. H. Storch. U. S. Bureau of Mines, Bulletin 504, 149 pages. (TN21 Un3b)

The above study developed correlations suitable for the design of new equipment in which fluids are brought into contact with granular materials. To arrive at general relationships, systems were chosen that did not involve chemical reactions, and a particular effort was made to give the correlations only in terms of quantities that are ordinarily available from general process and design specifications. Numerous graphs, tables, micrographs, and diagrams.

Books

1857 Termofil'nye Mikroorganizmy v Prirode i Praktike. (Thermophilic Micro-Organisms in Nature and Practice.) E. N. Mishustin. 391 pages. 1950. Academy of Sciences of the USSR, Moscow and Leningrad, U.S.S.R. (QR53 M68t)

Discusses the nature and possible utilization of thermophylic bacteria, i.e., microorganisms which are able to grow even at very high temperatures. Applications in the fermenting industry, in purifying spring waters, in disposal of city sewage, in treatment of organic manures, in food processing, etc., are described in detail. Lengthy bibliography is presented first in Russian, then in English.

1858 Microbial Decomposition of Cellulose With Special Reference to Cotton Textiles. R. G. H. Siu. 531 pages. 1951. Reinhold Publishing Corp., New York. (QR133 S91m)

A textbook presentation of the above. Includes casual organisms, mechanism of degradation, and methods of prevention. Chapter references.

See also:

1482 (chromatographic fractionation of petroleum)
1977 ("Catalysis in Organic Chemistry"—Russian book)
1989 (furane cements in chemical engineering equipment)
2020 (resin-fiber honeycomb cores)
2023 (rubber in chemical engineering)
2166 (chemistry in nuclear science—selected abstracts)
2280 (dyestuffs and printing inks)
2283 (print dyeing of fabrics—Cu complexes in)
2320 (petroleum-refining research)

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1859* Phase-Determining Relations Based on a Knowledge of the Electron-Density Function in Parts of the Unit Cell. (In English.) J. A. Goedkoop, Caroline H. MacGillavry, and Ray Pepinsky. *Acta Crystallographica*, v. 4, Nov. 1951, p. 491-492.

A general relation between structure factors is derived for the case where the electron density is shown in parts of the unit cell. Some special cases are discussed briefly. Also, it is shown that no information about the phases can be obtained from the fact that interatomic distances are known to exceed a certain minimum.

1860* Pseudo-Cubic Alkaline-Earth Tungstates and Molybdates of the R_2MX_6 Type. (In English.) E. G. Steward and H. P. Rooksby. *Acta Crystallographica*, v. 4, Nov. 1951, p. 503-507.

The formation of R_2WO_6-type alkaline-earth tungstates containing one or more alkaline-earth metals is described. They have structures approaching, and in some examples attaining, cubic symmetry. A structure, suggested by analogy with $(NH_4)_3FeF_6$, is tested and found to be correct in representing this arrangement. Deformations from true cubic symmetry exhibited by the compounds are briefly discussed and examples are given of the temperature dependence of this deformation.

1861* Initial Stage of Interaction Between Carbon and Hydrogen and Nickel Catalysts at Temperatures of Gasoline Synthesis. (In Russian.) I. A. Zaidenman and K. G. Khomiakov. *Doklady Akademii Nauk SSSR*, new ser., v. 78, June 11, 1951, p. 901-904.

For the purpose of investigating the character of the above, that is the interaction of C and H_2 with metals of iron group, a calorimetric study of kinetics of these processes was conducted. Technique of this method is described; data are tabulated.

1862* Method of Determining the Compressibility of Gases at High Pressures. I. R. Krichevskii and D. S. Tsiklis. *Doklady Akademii Nauk SSSR*, new ser. v. 78, June 21, 1951, p. 1169-1172.

Describes and diagrams apparatus developed for the above. Typical data obtained are tabulated and briefly discussed.

1863* The Use of Heavy Oxygen for Study of the Mechanism of Oxidation Catalysis. G. Ia. Turovskii and F. M. Vainshtein. *Doklady Akademii Nauk SSSR*, new ser., v. 78, June 21, 1951, p. 1173-1175.

CuO^{18} was used to investigate the above. Data are discussed and tabulated.

1864* Theoretical Dependence of Thermal Conductivity Coefficents of Gases on Temperature. (In Russian.) S. V. Vallander and M. P. Elovskikh. *Doklady Akademii Nauk SSSR*, new ser., v. 79, July 1, 1951, p. 37-40.

The thermal conductivities of air, N_2, and H_2 were calculated and the resulting values checked experimentally. Results are discussed and shown graphically.

1865* Concerning the Dehydrogenation and Hydrogenation Properties of Low-Percent Palladium Catalysts. (In Russian.) N. I. Shuikin, Kh. M. Minachev, and A. M. Rubinshtein. *Doklady Akademii Nauk SSSR*, new ser., v. 79, July 1, 1951, p. 89-92.

The above were investigated for Pd contents 0.05-2.0%. Data are discussed and tabulated.

1866 Iodides of Lower Valent Aluminum. Walter C. Schumb and Howard H. Rogers. *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5806-5808.

Describes preparation of the above. 15 ref.

1867 Exchange Studies With Complex Ions. III. The Nature of the Complex Formed Between Cobalt (II) and Potassium Cyanide, and Its Exchange With Radiocyanide Ion in Aqueous Solution. Arthur W. Adamson. *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5710-5713.

16 references.

1868 The Critical Temperature and Critical Pressure of Nitrogen. David White, Abraham Solomon Friedman, and H. L. Johnston. *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5713-5715.

Results obtained are compared with earlier vapor pressure data and with the critical constants estimated by extrapolation of P-V-T data.

1869 The Ternary System Potassium Bromide-Potassium Chloride-50% Aqueous Ethanol. Edward L. Simons and Samuel E. Blum. *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5717-5719.

The above was studied. As in water, the system belongs to Roozeboom Type II, but the solvent change shifts the crystallization end-point from 65.5 to 83.5 mole % KBr. Results are compared with those of others. 26 ref.

1870 Thermodynamic Properties and P-V-T Relations of Chlorotrifluoroethylene. George D. Oliver, J. W. Grisard, and C. W. Cunningham. *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5719-5722.

Presents an investigation on the above. Data are graphed and tabulated. 10 ref.

1871 Some Physical Properties of Hexadecafluoroheptane. George D. Oliver, S. Blumkin, and C. W. Cunningham. *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5722-5725.

The boling point, melting point, critical constants, density, surface tension, parachor, infrared and Raman spectra are reported for pure hexadecafluoroheptane. Refractive indices for the sodium D, mercury E and G, and hydrogen C and F lines at 20, 25 and 30° are given.

1872 The Imine Radical. Francis Owen Rice and Melvin Freamo. *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5529-5530.

When hydrazoic acid at low pressures is passed through a heated quartz tube, decomposition occurs presumably according to the equation $HN_3 \rightarrow NH + N_2$. The imine radical leaving the furnace can be frozen on a liquid nitrogen cooled surface, to give a blue solid which is paramagnetic. 14 ref.

1873 *In Situ* X-Ray Diffraction Studies of Heterogeneous Reactions. M. A. Mosesman. *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5635-5639.

An apparatus emobdying a metallic microreactor of approximately 0.002-ml. capacity, fabricated from high purity, machinable Be rod, was developed and utilized for the investigation of the changes that occur in solid materials through chemical interaction with gaseous reactants in a flow system as revealed by X-Ray powder diffraction patterns. Reports some further applications of this apparatus in the investigation of gas-solid reactions between ammonia synthesis catalyst, bulk MoO_3, and alumina-supported MoO_3 in reducing and oxidizing atmospheres. 12 ref.

1874 Precision Determination of Lattice Parameter, Coeffcient of Thermal Expansion and Atomic Weight of Carbon in Diamond. M. E. Straumanis and E. Z. Aka. *Journal of the American Society*, v. 73, Dec. 1951, p. 5643-5646.

21 references.

1875 Thorium Complexes With Chloride, Fluoride, Nitrate, Phosphate and Sulfate. E. L. Zebroski, H. W. Alter, and F. K. Heumann. *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5646-5650.

The dependence of the thorium extraction equilibrium on the fourth power of TTA activity and the minus fourth power of H-ion activity was demonstrated, confirming that Th (IV) is a simple (hydrated) tetrapositive ion in perchlorate solutions of acidity greater than about 0.08 M.

1876 Heats of Solution and Reaction in Liquid Ammonia. VIII. Harvey Dale Mulder and Frederic C. Schmidt, *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5575-5577.

Several heats of solution of inorganic salts were measured. The heat of neutralization of the ammono base, KNH_2, with the ammonium salts of various strong acids, was found to be 26.1 kcal. This heat effect is much larger than the heat of neutralization of strong acids and bases in water.

1877 Low-Temperature Heat Capacity and Entropy of Hydroxyapatite. Edward P. Egan, Jr., Zachary T. Wakefield, and Kelly L. Elmore. *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5579-5580.

The above investigation extends the study of heat capacities to low temperatures. The derived heat content and cc entropy at 25° are combined with previously reported values to obtain the thermodynamic properties of hydroxyapatite.

1878 Thermodynamic Properties of Fluorapatite, 15 to 1600°K. Edward P. Egan, Jr., Zachary T. Wakefield, and Kelly L. Elmore. *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5581-5582.

Presents results of measurements of the low-temperature heat capacity, the entropy and heat content as 298.16°K. and the high-temperature heat contents of fluorapatite. The heat capacity and heat contents were used to derive a table of thermodynamic properties for the range 298.16-1600°K.

1879 The Sorption of Vapors by Monolayers. III. A Surface Balance for the Measurement of the Effect of Vapors on Monolayers. IV. Calculation of the Amount of Hexane Adsorbed on a Stearic Acid Monolayer. Kenneth E. Hayes and Robert B. Dean. *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5583-5587.

An apparatus for the study of monolayers under vapors is described. Surface pressure was measured with a vertical plate Wilhelmy-type surface balance. 22 ref.

1880 The Visible and Ultraviolet Absorption Spectrum of the Tetrachloroferrate (III) Ion in Various Media. Harold L. Friedman. *Journal of the American Chemical Society*, v. 74, Jan. 5, 1952, p. 5-10.

Presents the results of the beginning of an investigation of the properties of solutions of electrolytes in solvents of low dielectric constant. The electrolytes discussed in this paper all have the type formula $M'\,M'''C^{-}_{4}$, where M' is a monovalent element or group and M''' a trivalent metal. 25 ref.

1881 Kinetics of the Periodate Oxidation of Manganese to Permanganate. Glenn R. Waterbury, Anson Mack Hayes, and Don S. Martin, Jr. *Journal of the American Chemical Society*, v. 74, Jan. 5, 1952, p. 15-20.

The above was studied by a spectrophotometric method. Oxidation of Mn^{++} was found to be autocatalytic. Some other prop-

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erties of the Mn^{+++}-iodate complex were reported. A mechanism for the oxidation is proposed to explain the rate dependences as well as other effects observed. 13 ref.

1882 The Effect of Inert Gases on the Quenching of Fluorescence in the Gaseous State. H. G. Curme and G. K. Rollefson. *Journal of the American Chemical Society*, v. 74, Jan. 5, 1952, p. 28-31.

Presents results of some studies of the fluorescence of β-naphthylamine in CCl_4. 10 ref.

1883 pH Change as an Index to Reaction Mechanisms. C. H. Sorum, F. S. Charlton, J. A. Neptune, and John O. Edwards. *Journal of the American Chemical Society*, v. 74, Jan. 5, 1952, p. 219-221.

A preliminary report of the pH changes of oxidation-reduction reactions is presented. Several of the observed curves for different types of reactions are included. The Landolt reaction (iodate oxidation of sulfite) is discussed in some detail to show how the pH-time curve correlates with the known stoichiometries and rate laws from other investigations.

1884 Thermodynamic Constants and the Degree of Dissociation of Bromine Chloride in Carbon Tetrachloride Solution. Alexander I. Popov and James J. Mannion. *Journal of the American Chemical Society*, v. 74, Jan. 5, 1952, p. 222-224.

The dissociation of BrCl at 25°C. was found to be 43.2±1%. The equilibrium constant for the reaction $2BrCl \rightleftarrows Br_2 + Cl_2$ in CCl_4 was calculated to be 0.145±0.006. Approximately the same values were obtained at 15 and at 10°C. The true absorption curve of BrCl is given as well as its molar absorbency index at the maximum.

1885 A Spectrophotometric Study of Chromate-Phosphate Complexes in Solution. Frank Holloway. *Journal of American Chemical Society*, v. 74, Jan. 5, 1952, p. 224-227.

Spectrophotometric investigation of chromic acid-phosphoric acid solutions indicate that two chromate-phosphate complex ions are formed. Equilibrium constants for the formation of the two complexes were determined at 25°C. and ionic strength of 0.25. 10 ref.

1886 Observations on Some Chemical and Physical Properties of Technetium and Its Compounds. Charles L. Rulfs and W. Wayne Meinke. *Journal of the American Chemical Society*, v. 74, Jan. 5, 1952, p. 235-236.

The composition of Tc_2S_7 was confirmed by analysis. Activity measurements on solutions prepared from this compound are in good agreement with recently reported precision values. The absorption spectrum of the pertechnetate ion was examined.

1887 Preparation of Radioactive Sodium Metal by Exchange of Na^{23} and $Na^{22}Cl$. Norman H. Nachtrieb, John A. Weil, and Edward Catalano. *Journal of the American Society*, v. 74, Jan. 5, 1952, p. 264.

Describes the above.

1888* Progress in Wetting and Rewetting Test Methods. Leonard Shapiro. *American Dyestuff Reporter*, v. 41, Jan. 7, 1952, p. P16-P24.

Several hydrometer designs are discussed and factors affecting correlation of hydrometer rate-of-wetting tests with other methods are discussed. Rewetting tests on various textiles by the loaded-tape method are described. 15 ref.

1889* A New Method of Determination of Wetting Power. G. Reutenauer, J. P. Sisley, and S. Dupin. *American Dyestuff Reporter*, v. 41, Jan. 7, 1952, p. P25-P30. (Translated from the French).

Presents results of a study of a new way of determining wetting power of various liquids for textile fibers, known as the hydrometer method. Precision is said to be superior to that of other methods. 16 ref.

1890 Mass Spectrometric Determination of Molecular Weights of Components of a Mixture. Murray Eden, Bernard Burr, and Arnold W. Pratt. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1735-1737.

The method developed was applied to a mixture of permanent gases and the molecular weights of the components computed from the data were found to agree with the accepted values to better than 1%.

1891 Apparatus for Microdetermination of Molecular Weights of Volatile Liquids. Leonard K. Nash. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1868-1870.

The above is based on the use of a click gage to indicate when a certain fiducial pressure difference exists between an external (manometer) system and an internal (testing) system. Diagram.

1892* Bibliography of Recent Literature on Physical Properties and Heat Contents of Petroleum Hydrocarbons, Their Binary and Multiple Mixtures, and Their Thermodynamics. (In German.) Curt Lochmann. *Brennstoff-Chemie*, v. 32, Oct. 17, 1951, p. 301-309.

Brief discussion and tabulated data are followed by a bibliography of 372 references.

1893 Plastic Properties and Recrystallization of Some Ionic Crystals. Paul L. Simth. *Ceramic Age*, v. 58, Nov. 1951, p. 41-42.

Reviews briefly the plastic deformation of simple halide salts and effects of heat on cold-worked ionic crystals, and discusses the results of some experimental work on grain growth in the silver halides after straining.

1894 An Empirical Equation for Thermodynamic Properties of Light Hydrocarbons and Their Mixtures; Reduction of Equation to Charts for Prediction of Liquid-Vapor Equilibria. Manson Benedict, George B. Webb, Louis C. Rubin, and Leo Friend. *Chemical Engineering Progress* (Engineering Section), v. 47, Dec. 1951, p. 609-620; disc., p. 620.

Concluding installment includes extensive charts, tabular data, and discussion of application to specific systems. 34 ref.

1895 Diffusion Rates in Extraction of Porous Solids. II. Two-Phase Extractions. Edgar L. Piret, R. A. Ebel, C. T. Kiang, and W. P. Armstrong. *Chemical Engineering Progress* (Engineering Section), v. 47, Dec. 1951, p. 628-636.

A previously presented investigation of rates of extraction or diffusion of soluble materials from capillaries, porous slabs, and spheres in the unsteady state, has been extended from single-phase to 2-phase systems. The equations developed relate the concentration at any point within the porous solid, the position of the solid-liquid interface, or the percentage extraction to time of extraction. Experimental measurements on single, straight capillaries and on porous alumina spheres were used to verify and demonstrate application of the equations. Integral diffusivities from saturated interfaces were measured for a series of compounds. Use of a pore-shape factor to characterize the retarding effect of porous structure of the inert solid previously proposed for single-phase extractions is shown to be applicable also to 2-phase systems. 16 ref.

1896 Magnetochemistry of the Heaviest Elements. Part V. Uranium Tetrafluoride—Thorium Tetrafluoride Solid Solutions. J. K. Dawson. *Journal of the Chemical Society*, Nov. 1951, p. 2889-2892.

Magnetic susceptibility of solid solutions of UF_4 and ThF_4 were measured over the range 90-350°K. At all dilutions the susceptibility of the U^{++++} ion obeys the Weiss-Curie law.

1897 Adsorption From Binary Solutions of Completely Miscible Liquids. Part I. Calculation of Surface Mole-fraction Isotherma. G. A. H. Elton. *Journal of the Chemical Society*, Nov. 1951, p. 2958-2961.

Shows that, for adsorption of solid from a solution of two completely miscible liquids, individual adsorption isotherms for the two components can be calculated from isotherms of apparent adsorption (concentration change), provided that allowance is made for the fact that adsorption of one component must always be accompanied by desorption of the other. The method is applied to Innes and Rowley's data on adsorption from CH_3OH-CCl_4 mixtures by charcoal, giving results in reasonably good agreement with those previously obtained by thermodynamic calculations based on vapor adsorptions.

1898 Pressure-Volume-Temperature Relations in Liquids and Liquid Mixtures. Part I. The Compression of n-Hexane, n-Heptane, n-Octane, and of Their Binary and Ternary Mixtures, up to 5000 Atmospheres. H. E. Eduljee, D. M.

Newitt, and K. E. Weale. **Part II. The Compression Isotherms of Some Organic Liquids up to 1000 Atmospheres, and the Compressions of Some Aqueous and Non-Aqueous Binary Liquid Mixtures.** D. M. Newitt and K. E. Weale. *Journal of the Chemical Society*, Nov. 1951, p. 3086-3098.

1899 The Cation Exchange Separation of Zirconium and Hafnium. B. A. J. Lister. *Journal of the Chemical Society*, Nov. 1951, p. 3123-3128, disc., p. 3128 .

The possibility of separating Zr and Hf by elution from a cation-exchange column with H_2SO_4, HCl, HNO_3, $HClO_4$, and $H_2C_2O_4$ was studied. A method was developed depending on H_2SO_4 elution whereby gram qualities of the two elements, in their naturally occurring proportions, can be separated by one passage through the column.

1900* Heat and Substance Transfer in Turbulent Particle Layers. (In German.) *Chemie-Ingenieur-Technik*, v. 23, Sept. 1951, p. 405-408.

Discusses new method of determining heat transfer between the gas stream and solid particles; also uses, advantages, disadvantages of the new method. Diagrams and graphs are prsented.

1901* Research on Thermal Conduction, Substance Transfer, and Pressure Drop in Loose Materials Traversed by Liquid or Gas Flows. (In German.) Walter Brötz. *Chemie-Ingenieur-Technik*, v. 23, Sept. 1951, p. 408-416.

Report of experimental and theoretical studies includes diagrams, and tables. 20 ref.

1902* Heat-Conductivity Measurements on Mixtures of Different Organic Compounds With Water. (In German.) L. Riedel. *Chemie-Ingenieur-Technik*, v. 23, Oct. 14, 1951, p. 465-469.

Discusses results of experiments made to determine effect of concentration and temperature on above. Results are critically compared with those of other authors. Includes graphs and tables. 17 ref.

1903* Catalysis and Solid Reactions. W. E. Garner. *Chemistry & Industry*, no. 47, Nov. 24, 1951, p. 1010-1015.

Summarizes what is known about basic properties of the solid state and solid surfaces, and shows the ways they enter into the problems of catalysis and solid reactions. Deals mainly with oxides, except where information is needed from other systems. 32 ref.

1904 The Limiting Equivalent Conductances of Hydrogen Chloride and Ammonium Chloride in Dimethylformamide. L. R. Dawson, M. Golben, G. R. Leader, and H. K. Zimmerman, Jr. *Journal of the Electrochemical Society*, v. 99, Jan. 1952, p. 28-29.

Reports conductance data for HCl and NH_4Cl in dimethylformamide, the limiting value for the acid being 70, and that for the salt 90.6. The observed limiting slopes of the Kohlrausch plots for these solutions show large deviations from those calculated theoretically by means of the Onsager equation.

1905* Selective Reactions on Ion Exchangers. (In German.) H. Deuel, J. Solms, L. Anyas-Weisz, and G. Huber. *Helvetica Chimica Acta*, v. 34, Oct. 15, 1951, p. 1849-1853.

Shows that ion exchangers can be used to effect selective reactions, that their utility is far greater for low-molecular weight than for high-molecular-weight compounds, and that specifity of the reactions depends on the ratio between size of reactive molecule and particle size of the exchanger. Data are tabulated. 35 ref.

1906* Relationship Between Combustion Heat and Symmetry Groups of Hydrocarbons. (In German.) Georg Karagounis. *Helvetica Chimica Acta*, v. 34, Oct. 15, 1951, p. 1999-2005.

Positive correlation between heat of combustion and symmetry of 70 hydrocarbons demonstrates that heat of combustion can be used to determine the steric structure of a given molecule. Data are graphed and tabulated.

1907* Measurement of Dielectric Constants and Absorption Coefficients of Ultra-High-Frequency Gases and Vapors. (In French.) Antoine Gemaoui. *Helvetica Physica Acta*, v. 24, Nov. 20, 1951, p. 401-418.

Dielectric constants and absorption coefficients of $CHCl_3$, CH_2, $COCH_2$ $(C_2H_5)_2O$, C_2H_5OH, C_6H_6, C_2H_5Cl, NH_3 and CCl_4 were measured at a frequency of about 9450 mc. per sec., at ordinary temperature and at various pressures from 0 to 760 mm. Hg for gases and from zero to saturation pressure for vapors. A new technique is described for measurement of absorption. 25 ref.

1908 A Calcium-Nickel Phosphate Dehydrogenation Catalyst. E. C. Britton, A. J. Dietzler, and C. R. Noddings. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2871-2874.

Presents and discusses results of research to provide an effective catalyst for the dehydrogenation of n-butenes to 1,3-butadiene.

1909 Isobaric Heat Capacity of Methane. Edward W. Sledjeski. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2913-2915.

Presents results of research, and methods of calculation for the above. Experimental values are limited to narrow ranges of variables. 10 ref.

1910* Role of Oxidized Radicals in Oxidation Reduction Reactions Produced by Ionized Rays. II. The Mechanism of Reactions on the Basis of the Composition of the Gases Formed. (In French.) *Journal de Chimie Physico-Chimie Biologique*, v. 48, July-Aug. 1951, p. 368-371.

Presents results of experiments on the composition of gases formed during irradiation of Ce salts by X-rays for the purpose of studying above mechanism. 13 ref.

1911* A Viscosity Nomogram for Hydrocarbons. (In German.) H. Umstatter. *Kautschunk und Gummi*, v. 4, Sept. 1951, p. 324-326.

Shows that positive linear correlation between temperature and viscosity of hydrocarbons makes it possible to establish, from two previously determnied viscosities, the viscosity of a given hydrocarbon or mixture of hydrocarbons at any temperature. Temperature-viscosity graphs are presented.

1912* Phase Diagram of the Surface Films of Water-Soluble Wetting Agents. (In German.) Karl Schäfer. *Kolloid Zeitschrift*, v. 124, Oct. 1951, p. 15-22.

Describes experiments made to determine the equation of state with the Langmuir scale and with Gibbs' equation. Results show that the amount of electrolyte has hardly any effect on the phase diagram of the film. Data are charted. 32 ref.

1913* Particle Size and Boundary Surface Phenomena in Emulsions. I. A New Emulsifying Device; Dependence of the Radii of Droplets on Mechanical Dispersion Conditions. II. Dependence of Radii of Droplets on Concentration of Emulsifying Agent and on Surface Tension. (In German.) L. Jürgen-Lohmann. *Kolloid Zetschrift*, v. 124 ,Oct. 1951, p. 41-43; Nov. 1951, p. 77-82.

New highly efficient emulsifying apparatus described and illustrated in Part I is so designed that the emulsion never touches anything but glass. Part II shows that nature of the emulsifying liquid, rather than surface tension, influence droplet size. Photographs, tables, and graphs.

1914* Research on Hydrated Aluminum Oxide. Part I. Precipitation of Hydrated Oxide from Alkali Solutions Under Different Conditions. (In German.) Narain Tewari and Satyeshewar Ghosh. *Kolloid Zeitschrift*, v. 124, Nov. 1951, p. 69-72.

Experiments on above were made at different temperatures and varying amounts of NaOH and NH_4OH in order to determine the adsorption of anions and cations after the reaction. Data are tabulated.

1915* X-Ray Small-Angle Dispersion of Densely Packed Colloidal Systems. Part I. (In German.) G. Porod. *Kolloid Zeitschrift*, v. 124, Nov. 1951, p. 83-114.

The general principles of small-angle dispersion and the special case of micellar systems were investigated theoretically and mathematically. Includes diagrams and graphs. 43 ref.

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1916* Evaporation of Liquid Into a Gas Passing Through the Liquid. (In German.) Stephan Vedrilla, *Mitteilungen des Chemischen Forschungsinstitutes der Industrie Österreichs*, v. 5, Oct. 1951, p. 85-88.

Discusses theoretically and mathematically the heat and mass transfer and vaporization process and other factors in liquid-gas mixtures.

1917* Glow-Discharge Electrolysis. XVIII. Formation of Hydrogen Peroxide under Different Experimental Conditions. (In German.) H. Wirth and A. Klemenc. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 82, Oct. 15, 1951, 868-879.

Describes experiments made to investigate the possibility of increasing the yield of active O_2 by altering the test conditions in the glow-discharge electrolysis of H_2SO_4. Includes diagrams, tables, and graphs.

1918 Activated Adsorption of Hydrogen on Nickel Catalysts. G. C. A. Schuit and N. H. De Boer. *Nature*, v. 168, Dec. 15, 1951, p. 1040-1041.

Discusses results recently reported in the literature. Presents new results, obtained with a catalyst consisting of 100 parts of Ni to 29 parts of SiO_2 (by weight), obtained by co-precipitation from nickel nitrate, sodium carbonate, and sodium silicate solutions and subsequent reduction.

1919* Metal-Monolayer Interactions. G. A. Wolstenholme and J. H. Schulman. *Journal of the Oil & Colour Chemists' Association*, v. 34, Dec. 1951, p. 571-579; disc., p. 579-580.

The interactions between metal ions and fatty acids are investigated by measuring the mechanical properties of fatty-acid monolayers on metal-salt solutions at different pH values. Emphasis is on pigment-oil suspensions.

1920* A New Aspect of Suspension Stabilities. G. D. L. Schreiner. *Journal of the Oil & Colour Chemists' Association*, v. 34, Dec. 1951, p. 581-586.

Suspensions of the oxides of Cu, Ni, and Zn in a number of polar and non-polar organic liquids were prepared under controlled conditions. A difference in rate of sedimentation which is not related to the viscosity was observed and correlated with reversibility of adsorption of the vapor on the corresponding solid. Illustrated.

1921* Kinetical Experiments on Ozonisation Reactions. (In English.) **I. Apparatus.** H. Boer and F. L. J. Sixma. **II. The Ozonisation of Benzene.** F. L. J. Sixma, H. Boer, and J. P. Wibaut. *Recueil des Travaux Chimiques des Pays-Bas*, v. 70, Nov. 1951, p. 997-1019.

18 references.

1922* The Preparation of Ozone By Electrolysis. (In English.) H. Boer. *Recueil des Travaux Chimiques des Pays-Bas*, v. 70, Nov. 1951, p. 1020-1032.

Some improvements in the design of the previously described electrolytic ozone generator are described. Ozone percentage and production are increased. By stabilization of the electrolyzing current, the apparatus has been shown to be highly satisfactory for quantitative purposes. A stabilizer is described by which composition of the O_3-O_2 mixture can be kept constant within a few units per mile for several hours. An apparatus capable of producing smaller amounts of high-percentage O_3, for use at low current strength, without internal cooling of the anode, is also described.

1923* Magnetic Method of Structural Investigation of Catalysts. A. Pacault. *Research*, v. 4, Dec. 1951, p. 548-555.

Shows some of the possibilities inherent in the above. Several catalysts were investigated and data are tabulated and graphed. 16 ref.

1924* Differential Heats of Adsorption of Ethylene Diamine on Coal. E. M. Dresel, E. Pritchard, and I. G. C. Dryden. **An Approximate Adsorption Isotherm for the Ethylene Diamine-Coal System.** E. M. Dresel, I. G. C. Dryden, and P. J. Farenden. *Research*, v. 4, Dec. 1951, p. 578-581.

14 references.

1925 Bakerian Lecture On Reactions in Monolayers. Eric Rideal. *Proceedings of the Royal Society*, ser. A, v. 209, Nov. 22, 1951, p. 431-446.

Reviews features of monolayers. Emphasis was placed on the chemical reaction which takes place when a monolayer undergoes reaction with a reactant injected into the substrate.

1926 The Photodecomposition of Barium Azide. J. G. N. Thomas and F. C. Tompkins. *Proceedings of the Royal Society*, ser. A, v. 209, Nov. 22, 1951, p. 550-561.

Results obtained on the rate of photolysis of barium azide and its variation with temperature and light intensity are reported. These are not in accord with Mott's mechanism, hence an alternative approach involving the production and trapping of excitons is proposed. Data are graphed. 12 ref.

1927* The Decomposition of Double Sulphates of Titanium & Bivalent Metals by a Wet Method. S. M. Mehta and S. R. Patel. *Journal of Scientific & Industrial Research*, v. 10B, Nov. 1951, p. 288-289.

1928* Basic Sulfates and Selenates of Nickel. (In German.) Georg Denk and Wolfgang Dewald. *Zeitschrift für anorganische und allgemeine Chemie*, v. 266, Oct. 1951, p. 83-90.

Describes synthesis and properties of several of the above compounds. 12 ref.

1929* Effect of Concentration on the Diffusion of Dissolved Substances (Electrolytes and Nonelectrolytes). (In German.) B. Grüttner and G. Jander. *Zeitschrift für anorganische und allgemeine Chemie*, v. 266, Nov. 1951, p. 225-249.

Experiments show that diffusibility of electrolytes in water drops to a minimum and then increases again with concentration, while that of organic substances continues to drop with increasing concentration. Considers also the effect of inert foreign substances. Data are charted and tabulated. 44 ref.

1930* Trivalent Copper. (In German.) R. Scholder and U. Voelskow. *Zeitschrift für anorganische und allgemeine Chemie*, v. 266, Nov. 1951, p. 256-268.

Reviews literature on the above and shows that persulfate oxidizes bivalent Cu into the trivalent form, but very incompletely. Other methods of oxidizing Cu^{++} and experiments on preparing hydrated Cu_2O_3 are described. Data are tabulated. 27 ref.

1931* Remarks on the Decomposition of Ferric Chloride Into Ferrous Chloride and on the Normal Entropy of Gaseous Ferric Chloride. Harald Schäfer. *Zeitschrift für anorganische und allgemeine Chemie*, v. 266, Nov. 1951, p. 269-274.

17 references.

1932* Reducing the Freezing Point of Molten Electrolytes by Adding Foreign Salts. I. (In German.) Ernest Kordes, Wolfgang Bergmann, and Werner Vogel. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie*, v. 55, Oct. 1951, p. 600-606.

Describes experiments in which carefully preformed cryoscopic measurements show that even melts of electrolytes are subject to the Raoult-van't Hoff's law of freezing-point reduction, excepting that only those added types of ions reduce the freezing point which were not previously present in the electrolyte. Data are charted. 13 ref.

1933* Temperature Dependence of the Thermal Conductivity of Some Gases. (In German.) E. U. Franck. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie*, v. 55, Oct. 1951, p. 636-643.

Thermal conductivities of CO_2, N_2, O_2, F_2, Cl_2, Br, I_2, HCl, HBr, NH_3, and HCN were determined in the gas phase at 0.1-0.5 atm. between 100 and 800°K. Literature is reviewed; results are tabulated and theoretically analyzed. 41 ref.

1934* Thermal Conductivity and Dissociation of Fluorine. (In German.) E. U. Franck and E. Wicke. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie*, v. 55, Oct. 1951, p. 643-647.

Describes preparation of fluorine by the thermal dissociation of ClF_3, and determination of the thermal conductivity of gaseous F_2 between 100 and 800°K., using Nernst's formula to

compute the expected temperature dependence of heat-conductivity coefficients. Diagrams, tables, and graphs. 23 ref.

1935* Measuring the Dependence of the Diffusion Coefficients of Gases on Temperature and Concentration. (In German.) Klaus Schafer, H. Corte, and H. Moesta. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie*, v. 55, Oct. 1951, p. 662-664.

Describes a method of measuring above and reports results obtained at −80 and +60°C. These results are compared with those computed by Andrussow's formula. Data are charted.

1936* Transformations of MoO_3 Crystals Observed by Means of the Electron Microscope. (In German.) Hans Konig. *Zeitschrift für Physik*, v. 130, Oct. 9, 1951, p. 483-492.

Discusses and illustrates the appearance of mobile schlieren in electromicrographs of MoO_3, which are explained by the irreversible reduction of MoO_3 to MoO_2. 37 ref.

1937* Theory of Rate of Evaporation. O. Knacke, I. N. Stranski, and G. Wolff. *Zeitschrift für physikalische Chemie*, v. 198, nos. 1-4, Oct. 1951, p. 157-185.

Mathematical study of above is based on models of liquids and crystals. Comparison of theoretical with experimental results shows close agreement in the evaporation of NH_4Cl and monoclinic As_2O_3; but cubic As_2O_3 can be reconciled with theory only by assuming a highly disturbed state in the lattice. Includes photographs, tables, and diagrams. 22 ref.

1938* Measuring Membrane Potentials of Commercial Ion Exchangers. I-II. (In German.) K. F. Bonhoeffer, L. Miller, and U. Schindewold. *Zeitschrift für physikalsiche Chemie*, v. 198, nos. 5-6, Oct. 1951, p. 270-285.

Shows that effect of electrolyte concentration on membrane potential and Teorell and Meyer's theory of membrane potentials can be used to calculate the solid-ion concentration in the membrane, also that K is absorbed in preference to Na and Na in preference to Li. Includes graphs and tables.

1939* Thermodynamic Functions of Al_4C_3, Si, SiO_2, SiC, AlF_3, and Na_3AlF_6. L. I. Ivanova. *Zhurnal Obshchei Khimii*, v. 21(83), Mar. 1951, p. 444-452.

Above are calculated theoretically, tabulated, graphed, and discussed. 24 ref.

1940* Thermal Analysis of the Binary Systems: $CdBr_2$-$ZnBr_2$, $CdBr_2$-$PbBr_2$, and $CdBr_2$-AgBr. G. A. Zakharchenko. *Zhurnal Obshchei Khimii*, v. 21(83), Mar. 1951, p. 453-456.

Constitution diagrams of the above system were determined experimentally. Data are charted and tabulated. 12 ref.

Miscellaneous Publications

1941 Viscosities of Air and Nitrogen at Low Pressures. Herrick L. Johnston, Robert W. Mattox, and Robert W. Powers. National Advisory Committee for Aeronautics, Technical Note 2546, Nov. 1951, 22 pages. (TL570 Un3t)

Presents results of the above investigation. Data are graphed and tabulated. 10 ref.

Books

1942 Karl A. Hofmann: Anorganische Chemie (Karl A. Hofmann's Inorganic Chemistry.) Ed. 14. Ulrich Hofmann and Walter Rüdorff. 864 pages. 1951. Friedr. Vieweg & Sohn, Braunschweig, Germany. (QD151 H67a14)

This book may be used as a handbook by the experienced chemist as well as a textbook by the student of chemistry. It describes comprehensively the properties, occurrence, preparation, and use of elements in organic compounds. Includes diagrams, tables, and (at the end) the spectra of several elements.

1943* Khimicheskaya Termiodinamika. (Chemical Thermodynamics.) M. Kh. Karapetiants. 546 pages. 1949. State Scientific-Technical Publishing House for Chemical Literature, Moscow and Leningrad. (QC311 K14k)

An advanced text. Numerous diagrams, nomograms, and graphs. 206 ref.

See also:

1317 (thermodynamics of alkali metals)
1340 (metallurgical thermochemistry—book)
1436 (determining aromatic molecular-weight distribution)
1709 (solid-phase reaction equilibria in refractories)
1771 (viscosity and molecular structure)
1891 (determining molecular weights of volatile liquids)
2147 (heat-capacity lag in gases)

27. CHEMISTRY—ORGANIC

1944* A Spectrophotometric Method of Study of the Hydration of Aldehydes. (In French.) Paul Rumpf and Claude Bloch. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 23, Nov. 26, 1951, p. 1362-1367.

Ethanol and methyl-2 propanol were studied in water-dioxane mixtures. Results show that the method, although not completely accurate, makes possible a comparison of the hydration of aldehydes of similar structures, even if they are insoluble in pure water.

1945 Influence of a CF_3 Group on an Adjacent Double Bond. III. Free Radical Additions. Albert L. Henne and Maxwell Nager. *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5527-5528.

In the above, the observed direction of addition is considered in terms of the currently proposed factors: center of electron density, stability of the intermediate radical, and steric considerations. 18 ref.

1946 The Kinetics of the Thermal Decomposition of Peresters. III. The Effect of p-Substituents on the Unimolecular Decomposition of t-Butyl Perbenzoates. A. T. Blomquist and Irving A. Berstein. *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5546-5550.

Ascertains the effects of various substituents on the energy and entropy of activation of the unimolecular decomposition of the peroxide bond in p-substituted t-butyl perbenzoates and to determine whether the Hammett equation would satisfactorily correlate these rates of decomposition with the electronic characteristics of the substitutents, this relationship having been applied with considerable success to other free-radical reactions. 15 ref.

1947 The Determination of the Isotope Effect and Its Variation With Temperature in the Dehydration of Formic-C^{14} Acid. Gus A. Ropp, A. J. Weinberger, and O. Kenton Neville. *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5573-5575.

Isotope effects which have been recently reported in the reactions of isotopic carbon-labeled organic compounds are of importance because of the possibility that such effects can cast doubt on the conclusions drawn from tracer experiments in chemical and biological systems. In the above work the effect of temperature on the magnitude of a simple isotope effect is reported.

1948 The Directing Influence of Substituents on the Chlorination of Halogenated Ethanes and Propanes. Murray Hauptschein and Lucius A. Bigelow. *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5591-5593.

A study was made on the above. It was found that these chlorinations were for the most part highly directed; and that this orientation could readily be predicted by means of the heretofore neglected London dispersion effect, which in turn is conveniently measured by the known atomic refractivities of the halogens. The relation between structure and the reactivities of specific hydrogen atoms was discussed, and a number of new halo-hydrocarbons were prepared and characterized. 16 ref.

1949 The Adsorption of Normal Paraffins on Cracking Catalysts. Robert C. Zabor and Paul H. Emmett. *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5639-5643.

Adsorption measurements were made for n-butane, n-heptane and n-octane on a Houdry S-46 cracking catalyst in the range from room temperature up to and above the lowest temperature at which decomposition occurs. The adsorption appears to be physical in nature up to about 150°C.

1950 Organic Compounds of Titanium. II. Association of Organic Titanates in Benzene Solution. III. The Electric Moments of Tetraethoxytitanium, Monochlorotriethoxytitanium, Tetrapropoxytitanium, Tetrabutoxytitanium and Ethyl Orthoformate in Hexane Solution. C. N. Caughlan,

27. *Chemistry—Organic*

Walter Katz, and William Hodgson. *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5652-5655.

14 references.

1951 The Argentation of Organic Iodides. L. J. Andrews and R. M. Keefer. *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5733-5736.

Presents evidence for the iodine atom argentation of cis- and trans-1,2-diiodoethylenes and of methylene iodide as based on measurements of the solubilities of these diiodides in aqueous silver nitrate. The results of similar measurements on related organic chlorides and bromides and also on o- and m-diiodobenzene are reported.

1952 The Basic Isomerization of Allyl Aryl Sulfides to Propenyl Aryl Sulfides. D. S. Tarbell and M. A. McCall. *Journal of the American Chemical Society*, v. 74, Jan. 5, 1952, p. 48-56.

A series of allyl aryl sulfides was shown to isomerize readily on treatment with base to the corresponding propenyl aryl sulfides. The structures were established in most cases by catlytic reduction of both isomers to the n-propyl aryl sulfides, as well as by consideration of the infrared and ultraviolet spectra. Mechanism is discussed. Spectrograms. 32 ref.

1953 Separation of Benzene Hexa-, Penta- and the Three Isomeric Tetracarboxylic Acids and Their Methyl Esters. D. E. Read and C. B. Purves. *Journal of the American Chemical Society*, v. 74, Jan. 5, 1952, p. 116-119.

Certain published information about the above acids was checked and used to separate them systematically by means of Ba salts insoluble at pH 10 and by means of the varying degree to which they were esterified by hot 3% methanolic HCl. 26 ref.

1954 Compounds of Zirconium and Hafnium Tetrachlorides With Esters. W. S. Hummers, S. Y. Tyree, Jr., and S. Yolles. *Journal of the American Chemical Society*, v. 74, Jan. 5, 1952, p. 139-141.

Describes techniques for the preparation of Zr (and Hf) tetrachloride-ester addition compounds and reports the determination of heats of formation of the compounds.

1955 The Effect of pH on the Combination of Serum Albumin With Metals. Charles Tanford. *Journal of the American Chemical Society*, v. 74, Jan. 5, 1952, p. 211-215.

Describes how semi-quantitative information on metal-protein complexes can be obtained with great rapidity from the polarographic current depression. The work reported is a study of complex formation between serum albumin and Cd, Zn, Pb, Cu, and Tl, and of the effect of pH upon the extent of interaction. 16 ref.

1956 The Inductive Effect and Chemical Reactivity. II. Reactions of Halides With Sodium Atoms. Richard P. Smith, and Henry Eyring. *Journal of the American Chemical Society*, v. 74, Jan. 5, 1952, p. 229-234.

The application of a theory previously presented to the calculation of charge distributions in halogen-substituted alkanes is discussed. Net charges on halogen atoms in a number of aliphatic halides, as well as X_2 and HX molecules, are calculated and used for a discussion of heats of activation for the sodium "flame" reactions. 27 ref.

1957* Thermomagnetic Studies of Iron Catalysts for the Synthesis of Hydrocarbons. (In German.) Heinrich Markel and Ferdinand Weinrotter. *Brennstoff-Chemie*, v. 32, Oct. 17, 1951, p. 289-297.

Experiments with a sensitive thermomagnetic device disproved the carbide theory, according to which the synthesis of hydrocarbons is accompanied by the formation of intermediate iron carbide. Data are graphed and tabulated. 22 ref.

1958 Autoxidation of Methyl Esters of Peanut Oil Fatty Acids. The Effects of Incubation Temperature and of Added Iron on Infrared Absorption Spectra and on Other Changes. H. W. Lemon, Elizabeth M. Kirby, and Ruth M. Knapp. *Canadian Journal of Technology*, v. 29, Dec. 1951, p. 523-539.

Studies changes that occur in the infrared absorption spectra of methyl esters of peanut-oil fatty acids during autoxidation, and relates them where possible to chemical analyses, especially to peroxide determinations. Effects of temperature of incubation and of presence of dissolved iron stearate upon these changes were noted. 30 ref.

1959 The Reaction Between Grignard Reagents and the Oxirane Ring. Norman G. Gaylord and Ernest I. Becker. *Chemical Reviews*, v. 49, Dec. 1951, p. 413-533.

243 references.

1960 Organic Reactions in Aqueous Solution at Room Temperature. Part I. The Influence of pH on Condensations Involving the Linking of Carbon to Nitrogen and of Carbon to Carbon. C. A. C. Haley and P. Maitland. *Journal of the Chemical Society*, Nov. 1951, p. 3155-3174.

Object of this series of papers is to broaden the field initiated by Robinson and Schöpf and usually termed "syntheses under physiological conditions," in relation to both biochemical problems and general organic synthetical methods. Extensive (rather than intensive) investigations have shown that water at room temperature is an effective medium for some very simple condensations involving substances containing several naturally occurring groups.

1961 The Reaction Between Aldehydes and Hydrogen Peroxide in Acid Solution. Part I. Formaldehyde. B. L. Dunicz, D. D. Perrin, and D. W. G. Style. *Transactions of the Faraday Society*, v. 47, Nov. 1951, p. 1210-1215.

The chief reactions which occur in a mixture of $CH_2O + H_2O_2$ are specified. Values of varying reliability have been obtained for the velocity and equilibrium constants.

1962 Acenaphthylene: Its Polymers and Copolymers. M. Kaufman and A. Fowler Williams. *Journal of Applied Chemistry*, v. 1, Nov. 1951, p. 489-503.

Gives details of the laboratory and semi-technical-scale preparation of acenapthhylene by the vapor-phase dehydrogenation of acenaphthene. Polymerization of acenapthylene is discussed together with some of the properties of the plasticized polymer. Copolymers with styrene have been studied in their preparation by bulk, bead, and emulsion processes and some of their properties are related to composition and mode of polymerization. 43 ref.

1963 Formaldehyde Condensations With Phenol and Its Homologues. XII. The Dehalogenation of Halogenated Diphenylmethanes Having Halogen Substituents in the Nucleus. S. R. Finn and G. J. Lewis. *Journal of Applied Chemistry*, v. 1, Nov. 1951, p. 524-526.

1964 Preparation and Properties of Esters of Polyorthotitanic Acid. T. Boyd. *Journal of Polymer Science*, v. 7, Dec. 1951, p. 591-602.

Reports the results of experimental work designed to clarify the confusion arising from earlier publications on the preparation of esters of orthotitanic acid, $Ti(OR)_4$, and describes the preparation and properties of some esters of polyorthotitanic acid. 25 ref.

1965* The Component Fatty Acids and Glycerides of Tung Oil. T. P. Hilditch and A. Mendelowitz. *Journal of the Science of Food and Agriculture*, v. 2, Dec. 1951, p. 548-556.

Data are tabulated. 17 ref.

1966* Trimethylamine Oxide and the Autoxidation of Unsaturated Fatty Esters. C. H. Lea and D. N. Rhodes. *Journal of the Science of Food and Agriculture*, v. 2, Dec. 1951, p. 556-561.

The action of trimethylamine oxide on unsaturated fatty esters was investigated. At 100°C. the oxide was reduced quite rapidly by autoxidizing esters, or by pre-oxidized esters in the absence of oxygen; unoxidized esters were unable to reduce the oxide in the absence of oxygen. 16 ref.

1967 Synthesis of Polyacetylenic Compounds. E. R. H. Jones, M. C. Whiting, J. B. Armitage, D. L. Cook, and N. Entwistle. *Nature*, v. 168, Nov. 24, 1951, p. 900-902.

Describes the above compounds in which the terminal groupings are separated by a chain of conjugated acetylenic, rather than ethylenic, linkages. 12 ref.

1968 A New Synthesis of p-Terphenyl and Its Derivatives. B. K. Ganguly and S. M. Mukherji. *Nature*, v. 168, Dec. 8, 1951, p. 1003-1004.

Describes experimental procedure and process for the above.

1969* The Benzoyl Peroxide Initiated Addition of Carbon Tetrachloride to Olefins. (In English.) E. C. Kooyman and E. Farenhorst. *Recueil des Travaux Chimiques des Pays-Bas*, v. 70, Nov. 1951, p. 867-891.

Initiation, propagation, and termination steps of the above are described. The propagation mechanism proposed by Kharasch and co-workers and the extent of telomer formation are estimated for the case of cetene. 23 ref.

1970* Esterification Catalysts. I. (In German.) Werner Hanske. *Zeitschrift für anorganische und allgemeine Chemie*, v. 266, Nov. 1951, p. 216-224.

Describes investigation of spontaneous esterification of acetic acid in ethanol at 80°C. Study reveals that members of the alkali-earth group greatly increase the reaction rate. Buffer experiments show that increase of dissociation of acetic acid is the cause of catalytic effect. Data are graphed and tabulated. 19 ref.

1971* Hydrolysis of Vinyl-Phenyl Esters. (In Russian.) M. F. Shostakovskii and A. V. Bogdanova. *Zhurnal Obshchei Khimii*, v. 21(83), Apr. 1951, p. 632-634.

Above esters were prepared in an autoclave by the Favorskii-Shostakovskii method. Hydrolysis was carried out using 2% H_2SO_4. Results are discussed and tabulated. 12 ref.

1972* Photoreactions of Metal-Organic Compounds of Mercury in Solutions. VI. Reactions of Dimesitylmercury. (In Russian.) G. A. Razuvaev, Iu. A. Ol'dekoi, and M. N. Koroleva. *Zhurnal Obshchei Khimii*, v. 21(83), Apr. 1951, p. 650-655.

1973* Synthesis With the Aid of Zinc Chloride. VI. Use of Metallic Zinc and Zinc Chloride for Alkylation of Aromatic Compounds by Alkyl Chlorides. (In Russian.) A. B. Kuchkarov. *Zhurnal Obshchei Khimii*, v. 21(83), Apr. 1951, p. 685-687.

1974* The Action of Inhibitors During Catalytic Hydrogenation of Certain Acetylene and Ethylene Alcohols. II. (In Russian.) Kh. V. Bal'ian. *Zhurnal Obshchei Khimii*, v. 21(83), Apr. 1951, p. 720-729.

The effect of various inhibitors was investigated. Data are discussed, tabulated, and charted.

Miscellaneous Publications

1975 Infrared Spectra of 59 Dicyclic Hydrocarbons. K. T. Serijan, I. A. Goodman, and W. J. Yankauskas. National Advisory Committee for Aeronautics, Technical Note 2557, Nov. 1951, 37 pages. (TL570 Un3t)

Presents the above consisting of diphenylalkanes, dicyclohexylalkanes, alkylbiphenyls, and alkylbicyclohexyls ranging from C_{12} through C_{18}. Physical properties of these compounds are tabulated.

1976 The Flammability Characteristics of the C_nH_{2n-6} Aromatic Series. M. G. Zabetakis, G. S. Scott, and G. W. Jones. U. S. Bureau of Mines, Report of Investigations 4824, 9 pages. (TN21 Un3r)

Presents results of tests on the above; apparatus is diagrammed; data are tabulated and charted.

Books

1977 Kataliz v Organicheskoi Khimii. (Catalysis in Organic Chemistry.) B. N. Dolgov. 560 pages. 1949. Government Scientific-Technical Publishing House for Chemical Literature, Leningrad and Moscow, U.S.S.R. (QD501 D68k)

Chapter 1 covers principles of catalysis and their preparation. Other chapters deal with theory and mechanism of catalysis; catalytic oxidation; dehydrogenation; catalytic cracking; hydrogenation; catalytic dehydration; polymerization; synthesis of compounds from natural gas and from industrial carbonaceous gases; and catalytic halogenation.

1978 Histamine Antagonists. Frederick Leonard and Charles P. Huttrer. 122 pages. 1950. Chemical-Biological Coordination Center, National Research Council, Washington, D. C. (QP801.H6 L55h)

Discusses the chemistry of and the preparation of the above. Data are tabulated.

See also:

1441 (saponification of ethylacetate)
1498 (ultraviolet spectra of aromatic compounds)
1686 (knock resistance vs. chemical structure—pure hydrocarbons)
1823 (new benzene-synthesis process)
1833 (atmospheric oxidation of aromatics to phthalic anhydride)
1865 (dehydrogenation and hydrogenation with Pd catalysts)
1908 (Ca-Ni phosphate dehydrogenation catalyst)
2063 (organic fungicides)

28. PLASTICS AND HIGH POLYMERS

1979 Ionic Copolymerization. The Effect of Reaction Conditions on the Monomer Reactivity Ratios for the System Styrene-p-Chlorostyrene-Stannic Chloride. C. G. Overberger, Lester H. Arnold, and John J. Taylor. *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5541-5545.

Reports results of an investigation on the above. Some data are also presented for the system p-chlorostyrene-a-methylstyrene. 20 ref.

1980 The Thermal Degradation of Polyesters. Herbert A. Pohl. *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5660-5661.

The general character of thermal degradation in hot polyesters was examined. In particular, the degradation of molten terephthalic acid-ethylene glycol polyester was shown to involve considerable main-chain cracking resulting in lowered molecular weight. Study of a number of polymers of varied structure has thrown some light on the probable weak points for their thermal degradation.

1981 Melting Temperature and Polymer-Solvent Interaction: Polychlorotrifluoroethylene. A. M. Bueche. *Journal of the American Chemical Society*, v. 74, Jan. 5, 1952, p. 65-67.

The above was measured. The results, when compared with the theory for the phenomenon, are shown to give consistent values for the heat of fusion and the solubility parameter of the polymer. The Flory-Huggins theory of polymer solutions was used to explain the results for higher diluent concentrations, where a 2-phase system existed.

1982 The Solubility of Polytrifluorochloroethylene. H. Tracy Hall. *Journal of the American Chemical Society*, v. 74, Jan. 5, 1952, p. 68-71.

Presents the results of a physicochemical study of the solubility behavior of the above semicrystalline polymer in normal solvents. The principal problems considered are as follows: the prediction of solution temperature when certain fundamental data are known, the lowest solution temperature to be expected, and determination of thermodynamic quantities for the polymer-solvent systems.

1983* Some Observations on the Polymerization of Styrene in the Presence of Oils. L. B. Falkenburg, W. H. Hill, and Hans Wolff. *Journal of the American Oil Chemists' Society*, v. 28, Dec. 1951, p. 496-498.

Properties of products obtained by polymerizing styrene in the presence of drying and semi-drying oils are presented. Evidence is given showing that conjugation in an oil or peroxide content are not of fundamental importance for obtaining homogeneous products. Use in surface-coating field is mentioned. 16 ref.

1984* Plastic Boat Programs. Arthur C. Bushey, Jr. *Journal of the American Society of Naval Engineers*, v. 63, Nov. 1951, p. 873-879.

Discusses and evaluates production methods and design of plastic boats.

1985 Metal Plating on Plastics. *Automotive Industries*, v. 106, Jan. 1, 1952, p. 49.

Describes how phenolic, styrene, and vinyl plastics may be plated with a hard film of Cu, Ag, Cr, or other metal by employing recently-developed mass production techniques.

28. *Plastics and High Polymers*

1986* The Stretching and Relaxing of Polyethylene. R. A. Horsley and H. A. Nancarrow. *British Journal of Applied Physics*, v. 2, Dec. 1951, p. 345-351.

Presents results of an investigation on the above to provide information on the deformation processes occurring during this phase of the manufacture of these monofilaments. Photomicrographs. 10 ref.

1987* The Measurement of the Viscosity of Highly Viscous Plastic Mixes at High Rates of Shear. J. J. Benbow. *British Journal of Applied Physics*, v. 2, Dec. 1951, p. 359-363.

Describes the construction of an instrument suitable for the testing of pastes with viscosities of several hundred poises at rates of shear of from 5000 to 25,000 reciprocal seconds. The average rise of temperature resulting from the work done on such a paste is calculated to be of the order of 13°C. at the highest rate of shear. Typical results are presented and it is shown that the instrument may be used to detect thixotropy or shear hardening.

1988 Low-Pressure Laminates for Aircraft. *British Plastics*, v. 24, Dec. 1951, p. 415-420.

Describes and discusses techniques used in the above. Material is glass cloth bonded with a low-pressure resin.

1989 Furane Cements. Raymond B. Seymour and Robert H. Steiner. *Chemical Engineering*, v. 58, Dec. 1951, p. 268, 270, 272, 274, 276-278, 280-282, 284.

Presents charts giving corrosion data for polyfurfuryl alcohol-resin cements with pure carbon filler.

1990 Plastics. E. E. McSweeney. *Chemical and Engineering News*, v. 30, Jan. 7, 1952, p. 24-25.

Annual review of developments.

1991 The Effect of Structure of Diacyl Peroxides on the Rates of Initiation of the Polymerisation of Styrene. W. Cooper. *Journal of the Chemical Society*, Nov. 1951, p. 3106-3113.

Rates of initiation of the polymerisation of styrene by 74 diacyl peroxides were determined. Results are tabulated and discussed.

1992 Polyethylene for Wire and Cable. V. T. Wallder. *Electrical Engineering*, v. 71, Jan. 1952, p. 59-64.

Use of polyethylene as a cable sheath is discussed in the light of difficulties encountered during actual field use. Protection against weathering is one problem; another is stress cracking when the polyethylene is subjected to certain environments such as soaps, alcohols, and wetting agents. Data are charted and tabulated. Appearance of deteriorated material is illustrated. 18 ref.

1993* The Properties of Insulating Materials Used in Instruments. C. G. Garton. *Proceedings of the Institution of Electrical Engineers*, v. 98, pt. 2, Dec. 1951, p. 728-737.

A general discussion of the properties of insulating materials used in electrical instruments, with emphasis on new synthetic organic materials. Values of dielectric constant and loss angle are tabulated. Structures of the main polymers of electrical interest and relations between structure and electrical properties are briefly indicated. Also deals with miscellaneous new materials for sealing against moisture, for cooling by an immersion medium, and for adhesive purposes. 19 ref.

1994* Electron Microscopy of Fibers Obtained From Reactions Between Copper and a Fraction of Pyocyanine. Walter S. Moos. *Journal of Bacteriology*, v. 62, Dec. 1951, p. 767-770.

Previous investigators found that mixtures of cystine and Cu salts, when dried on "formvar" or collodion-coated screens, gives rise to long fibers which are probably a polymer of a Cu-cystine complex. This work indicated the possibility of fiber formation between metals, especially Cu, and other biological materials. Electron micrographs.

1995 The Relative Reactivities of Initiating Radicals in Vinyl Polymerizations. Ralph L. Herbst, Jr., *Journal of Polymer Science*, v. 7, Dec. 1951, p. 587-590.

As a possible approach to the above, theoretical considerations are presented for the extension of the Alfrey and Price treatment of copolymerization to the initiation process.

1996 The Intrinsic Viscosity of Nitrocellulose. Charles H. Lindsley. *Journal of Polymer Science*, v. 7, Dec. 1951, p. 635-652.

The problem of the determination of the intrinsic viscosity of nitrocellulose in solution is considered; and the influence of rate of shear on the viscosity measurements is discussed. Several empirical or semi-empirical equations for calculating this quantity are examined, and the range of concentration and viscosity over which they remain valid is shown. The relation between intrinsic viscosity and degree of polymerization is discussed.

1997 Effect of Rate of Cooling on Stress Relaxation of Polymethyl Methacrylate. J. R. McLoughlin and A. V. Tobolsky. *Journal of Polymer Science*, v. 7, Dec. 1951, p. 658.

Results of an investigation on the above show that the properties depend on the rate of cooling through the transition temperature.

1998* Effect of Ultrasonic Waves on the Emulsion Polymerization of Vinyl Acetate; Effect of Ultrasonic Waves on the Colloids. (In German.) Naoyasu Sata and Yukio Harisaki. *Kolloid Zeitschrift*, v. 124, Oct. 1951, p. 36-40.

Experiments made with and without mechanical stirring on the application of ultrasonics show that the latter greatly increases the yield of polymerizate. Experimental procedure is described; data are tabulated. 10 ref.

1999* Electrolyte Coagulation of Water Soluble Polysaccharides and Other High Polymers. (In German.) H. Deuel and J. Solms. *Kolloid Zeitschrift*, v. 124, Nov. 1951, p. 65-69.

Describes above and shows that the process can be used in the quantitative analysis of high polymers. Includes two large tables covering 36 polymeric materials and numerous references.

2000* Survey of Relations Between the Phenomenon of Diffusion of Light and the Properties of Macromolecular Solutions. (In French.) P. Outer. *Makromolekulare Chemie*, v. 7, Oct. 1951, p. 111-139.

Theory of diffusion of light, with special emphasis on study of macromolecular solutions, is reviewed in simple terms. Influence of depolarization on diffusion intensity is discussed. Reviews methods of investigation and presents typical results.

2001* Determination of Constituents of an Interpolyamide. (In French.) F. Ecochard and N. Duveau. *Makromolekulare Chemie*, v. 7, Oct. 1951, p. 148-162.

Describes potentiometric procedure applied to the hydrolysate.

2002* Heat of Solution of Polystyrene in Different Solvents. (In German.) H. Hellfritz. *Makromolekulare Chemie*, v. 7, Oct. 1951, p. 191-198.

Calorimetric apparatus is described and diagrammed; data are charted, tabulated, and discussed.

2003* A Polymeric 2,3-Dimethylbutadiene Peroxide. (In German.) W. Kern and J. Stallman. *Makromolekulare Chemie*, v. 7, Oct. 1951, p. 199-204.

Autoxidation of 2,3-dimethylbutadiene yields a polymeric peroxide. Dimethylbutadiene and oxygen were found to be linked mainly by 1,2-copolymerization. Thermal decomposition of the polymeric peroxide in suspension or dilution produces formaldehyde and isopropenylmethylketone. Monomeric dimethylbutadiene peroxide could not be isolated. 19 ref.

2004 Materials Supply and Demand. *Modern Plastics*, v. 29, Jan. 1952, p. 77-86.

Gives information regarding the economic situation of cellulosics, phenolics, polystyrene, urea, melamine, the vinyls, polyethylene, acrylic and nylon plastics. Includes tabulated data.

2005* Application Trends in 1951. *Modern Plastics*, v. 29, Jan. 1952, p. 87-92.

Describes and illustrates many industrial and military uses for plastic materials.

2006 And Now the "Plastigels." Richard W. Quarles, Edward T. Severs, Arthur C. Frechtling, and Hugh S. Carpenter. *Modern Plastics*, v. 29, Jan. 1952, p. 99-101.

Includes information on preparation, mobility, flow properties, fusion, effect of plasticizer, and applications of plastigels.

2007 Protection for Sewer Pipes. *Modern Plastics,* v. 29, Jan. 1952, p. 102-103.

Describes and illustrates the use of molded vinyl sheet for the successful protection of concrete sewer pipe against H_2S. It is unaffected by bacteria, acids, alkalies, humidity, oxidation, and aging.

2008 Engineering Progress in 1951. *Modern Plastics,* v. 29, Jan. 1952, p. 107-110, 112-115, 118-120, 122.

Surveys the above. Deals specifically with electroforming, seam sealing, liquid blasting, formulas for plastics calculations, advances in dry coloring, new methods of processing, and applications of plastics.

2009 The Year 1951 in Review. *Modern Plastics,* v. 29, Jan. 1952, p. 125-126, 128, 130, 132, 134, 136, 138, 186-196.

Reviews the plastics situation. Surveys materials, processes, production, applications, and potentialities.

2010* Polyamide Resin Suspensoids. F. B. Speyer. *Paint, Oil & Chemical Review,* v. 115, Jan. 3, 1952, p. 7-8, 10-11, 30-31.

Discusses the above with respect to grades, properties, and uses. Tabulated data.

2011* Phenolic Resins and Their Varnishes. Barge Golding. *Paint and Varnish Production,* v. 41, Dec. 1951, p. 12-13, 44-45.

Evaluates the above. Discusses the influence of catalysts and pH on resin preparation. Properties of the varnishes produced from the resins are surveyed.

2012* Cementing Thermoplastic Mouldings. Vivian Stannett and D. W. Jay. *Plastics,* v. 16, Oct. 1951, p. 281-283; Nov. 1951, p. 310-311; Dec. 1951, p. 348-350.

Discusses some of the principles involved in cementing, some of the cements which are available, and methods of application used. Safety factors involved when using cements containing toxic and inflammable solvents are discussed. Part II describes methods of application of the cements and the hazards involved in handling them. Part III deals with toxicity characteristics of solvents employed in cementing thermoplastics.

2013* Utilization of Ultrasonics in the Plastic Industry. I. W. S. Penn. *Plastics,* v. 16, Nov. 1951, p. 317-318; Dec. 1951, p. 351-352.

Part I describes the principles involved in the use of the new technique as well as some of the applications in the plastics industry. Some indication of other properties of ultrasonics was also given. Part II treats the degradation of polymers and the measurement of constants. 22 ref.

2014* The Bonding of Friction Fabric. G. S. Learmonth. *Plastics,* Dec. 1951, p. 340-341.

Discusses the above giving a brief history of the subject. Such factors which affect the behavior of friction fabrics to their metallic supports are temperature, solvents remaining on the adhesive film before bonding, pressure during bonding, and baking-time temperature.

2015* Flow Standardization in Injection Machine Nozzle Design. A. R. Morse. *Plastics Industry,* v. 9, Dec. 1951, p. 9-14.

Deals with the results of prolonged tests leading to the development of a proven, standardized, modern nozzle design now successfully adapted for all kinds of injection machines.

2016* Outline of Procedure for Making Plastic Plates and Summary of Use Qualities. James F. Wall. *Printing Equipment Engineer,* v. 82, Dec. 1951, p. 84.

Describes the above as employed by CSW Plastic Types, Inc., Hartford, Conn.

2017 Vinyl Plastisols. John Delmonte. *Product Engineering,* v. 23, Jan. 1952, p. 154-156.

Describes properties and applications. Graphs and tables.

2018 Calorimetry of High Polymers. I. Automatic Temperature Recording and Control of Adiabatic Jackets. Malcolm Dole, W. P. Hettinger, Jr., Norman Larson, J. A. Wethington, and A. E. Worthington. **II. Use of a Watt-Hour Meter.** Malcolm Dole, N. R. Larson, J. A. Wethington, Jr., and R. C. Wilhoit. *Review of Scientific Instruments,* v. 22, Nov. 1951, p. 812-820.

Part I describes an adiabatic aneroid calorimeter for the measurement of the specific heat of high polymers from −20 to 300°C. Part II describes a method of using an a.c. watt-hour meter for measurement of electrical energy in calorimetry. Tables, graphs, and diagrams. 15 ref.

2019* Adsorption of High-Molecular-Weight Substances From Their Solutions. (In German.) E. Jenckel and B. Rumbach. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 55, Oct. 1951, p. 612-618.

Describes experiments made to determine the adsorbing power of different agents on dissolved polymers at 25 and 50°C. It was found that the adsorbed layer sometimes exceeds the thickness of a molecule. An attempt is made to explain the fact that adsorptivity is at times higher at the higher than at the lower temperature. Data are graphed and tabulated.

Miscellaneous Publications

2020 Properties of Honeycomb Cores as Affected by Fiber Type, Fiber Orientation, Resin Type, and Amount. R. J. Seidl, D. J. Fahey, and A. W. Voss. National Advisory Committee for Aeronautics, Technical Note 2564, Nov. 1951, 36 pages. (TL570 Un3t)

Gives results of the above investigation. Structures examined were made from non-woven cotton, non-woven rayon, and paper. Some cores had the principal fiber grain parallel to, and others had it perpendicular to, the cells of the honeycomb. Tests include determination of physical properties and equilibrium moisture content of the base sheet material, and determination of tensile and comprehensive strengths in wet and dry conditions.

See also:

1145 (resin sealing of porous casting)
1192 (plastic dies for forming sheet metals)
1262 (metallizing of plastics)
1268 (metallizing of plastics)
1585 (die design for thermosetting laminates)
1715 (color index for floor-tile resins)
1854 (fluid separation with permeable plastics)
1870 (P-V-T relations of chlorotrifluoroethylene polymers)
1962 (polymerization of acenaphthylene)
2039 (strippable resin coating for plastics)
2055 (polymer for soil-structure improvement)
2253 (resin-bonded mica insulation)
2284 (vinyl-resin industry)

29. RUBBERS AND OTHER ELASTOMERS

2021 Copolymerization. XVIII. The Reactivity of Butadiene in Emulsion Copolymerization at 5°. Cheves Walling and John A. Davison. *Journal of the American Chemical Society,* v. 73, Dec. 1951, p. 5736-5738.

The compositions of synthetic rubbers derived from butadiene were studied. Monomer reactivity ratios were determined for the copolymerization of butadiene with various other monomers.

2022 Molecular Dimensions of Natural Rubber and Gutta Percha. H. L. Wagner and P. J. Flory. *Journal of the American Chemical Society,* v. 74, Jan. 5, 1952, p. 195-200.

The above was determined from intrinsic viscosities measured at the limiting critical miscibility temperature in methyl n-propyl ketone and in n-propyl acetate, respectively. Several fractions of each polymer were used; molecular weights were determined osmotically. 15 ref.

2023 Rubber in Chemical Engineering; Specialized Uses for Synthetics. *Chemical Age,* v. 65, Dec. 8, 1951, p. 767-770.

Discusses the versatility of rubber and its allied products. Gives properties and applications of various synthetic formulas and sites advantages and difficulties.

2024 Rubber. John Tatum Cox, Jr. *Chemical and Engineering News,* v. 30, Jan. 7, 1952, p. 20-21.

Annual review of developments.

29. *Rubbers and Other Elastomers*

2025* Improvements in Artificial Ageing Ovens. S. Eccher and S. Oberto. *Transactions of the Institution of the Rubber Industry*, v. 27, Dec. 1951, p. 325-337; disc., p. 337-338.

Two ovens are described—one vapor-jacketed and the other heated directly by electricity. Their relative temperature uniformities are given. Air agitation favors the passage of the antioxidant between mixes aged simultaneously. The possibility of carrying out separate aging tests without recourse to the test-tube method is discussed. 12 ref.

2026* Recent Developments in Electrostatic Test Equipment for Evaluating Rubber and Associated Materials; Electrostatic Probe for Banbury Mixer. R. S. Havenhill, L. E. Carlson, H. F. Emery, and J. J. Rankin. *Transactions of the Institution of the Rubber Industry*, v. 27, Dec. 1951, p. 339-362; disc., 362-363.

A new "electrostatic probe" and associated equipment are described for measuring and recording the changes in electrical potential of the rubber batch during mixing in the Banbury Mixer. By means of electrical changes recorded with this new device, breakdown of the rubber, state of incorporation of the pigment, oils and other ingredients can be followed without raising the ram or otherwise disturbing the mixing operation. Electrostatic contact-potential incorporation charts are shown for mixing of both positive and negative softeners in rubber.

2027* Application of the Measurement of the Dielectric Constant and Loss Angle to the Study of the Structure of Vulcanisates Loaded With Carbon Blacks. P. Thirion and R. Chasset. *Transactions of the Institution of the Rubber Industry*, v. 27, Dec. 1951, p. 364-381; disc., 381.

14 references.

2028 Studies on Rate of Emulsion Polymerization of Butadiene-Styrene (75:25) as a Function of Amount and Kind of Emulsifier Used With Persulfate as Activator. IV. Addition of Emulsifier During Reaction. Seeding Effects. I. M. Kolthoff, E. J. Meehan, and C. W. Carr. *Journal of Polymer Science*, v. 7, Dec. 1951, p. 577-586.

10 references.

2029* Investigations on the Reversion of Vulcanized Rubber Under Heat. Uma Shankar. *Journal of Scientific & Industrial Research*, v. 10B, Nov. 1951, p. 263-269.

Chemistry of the above was investigated under conditions in which secondary reactions due to the action of light and oxygen are eliminated. It is shown that reversion is caused by a breakdown of cross-linkages in the vulcanizate molecule, and that temperature governs the extent of reversion. 40 ref.

2030* Relations Between Reactivity of Filler and Vulcanization. (In German.) A. Boettcher. *Kautschuk und Gummi*, v. 4, Nov. 1951, p. 409-411.

Discussion of experimental results includes graphs which show the great effect of fillers on the physical properties of vulcanized rubber.

2031* The Use of Hi-Sil in Natural Rubber. (In French.) Ralph F. Wolf. *Revue Générale du Caoutchouc*, v. 28, Nov. 1951, p. 791-796.

Describes use of above, which is a fine-particle silica pigment. Gives recommended procedures for incorporation in natural-rubber molded goods. Discusses choice of plasticizers, accelerators, and antioxidants. Gives experimental data showing effects of varying proportions of Hi-Sil and of accelerators on properties of rubbers. Some typical natural-rubber formulations are given.

2032* A Study of the Aging of Rubber Articles Made From "Trypsinated" Latex. (In French.) Guy Croux and Serge Lemarchand. *Revue Générale du Caoutchouc*, v. 28, Dec. 1951, p. 867-871.

Aging effects of various amounts of sulfur and of different accelerators were studied, as well as influence of various antioxidants. It was concluded that preservation of vulcanizates made from molded latex is not as easy as for dry rubber mixes.

2033* Influence of Crumb Rubber on the Scorch Characteristics of Rubber Mixes. (In French.) Adrien Haehl. *Revue Générale du Caoutchouc*, v. 28, Dec. 1951, p. 872-874.

Comparative experiments were conducted on 2 basic mixes containing: 1st, 2 fast accelerators—mercaptobenzothiazole and diphenylguanidine; 2nd, a fast accelerator by itself—zinc dibutyl dithiocarbamate. Crumb rubbers of different origins were incorporated with these mixes. Curves show influence of nature of crumb rubber and of accelerator on scorch tendency. Includes theoretical explanation of the observations.

2034 Zinc Oxide in Latex. 1. Preparation of Aqueous Suspensions for Addition to Latex Compounds. H. C. Jones and C. A. Klaman. *Rubber Age*, v. 70, Dec. 1951, p. 325-332.

Includes technical data and a detailed discussion of the above. Tabulated test results and graphs.

2035 Recent Developments in the Field of Oil-Enriched Rubbers. K. V. Weinstock, L. M. Baker, and D. H. Jones. *Rubber Age*, v. 70, Dec. 1951, p. 333-338.

Discusses problems of compounding and processing oil-enriched rubbers. Preliminary evaluations indicate superiority over regular cold rubber. On account of their lower heat generation and resistance to heat aging, they may prove superior to natural rubber.

2036 Selected Rubber References for the Mechanical Engineer—July, 1950-June, 1951. R. E. Shrader and R. M. Turner. *Rubber Age*, v. 70, Dec. 1951, p. 343-345.

Presents an outline of rubber articles published during the past year. Those believed to be of special interest to the engineer are discussed in some detail.

Books

2037 Adhesion and Adhesives. N. A. De Bruyne and R. Houwink, editors. 517 pages. 1951. Elsevier Publishing Co., New York. (TP968 D35a)

A symposium by specialists. Collects in one volume, information about the scientific and technological aspects of adhesion. Chapter bibliographies.

See also:
1513 (rubber structure by electron microscope)

30. PAINTS, VARNISHES, LACQUERS, AND ENAMELS

2038 Shrinkage of Some Organic Film Forming Materials During Aging. L. L. Carrick and A. J. Permoda. *American Paint Journal*, v. 36, Jan. 14, 1952, p. 64, 66, 68, 70, 72, 74, 76-77, 80, 82, 84.

Presents results of an investigation on shrinkage characteristics of 7 materials.

2039 Evaluation of Strippable Protective Coating for Acrylic Plastics. Howard G. Pfleiderer and Roy A. Machlowitz. *ASTM Bulletin*, Dec. 1951, p. 59-62.

The work reported was performed to provide a basis for specification covering the above. Tests were devised to evaluate sprayability, "delivery rate" viscosity, effect on stressed plastics, usability in normal shop operations, stacking under load, adhesion, tensile strength, ultimate elongation, strippability after weathering, protection of stressed and unstressed plastic from paint materials, and storage stability. Test results on one satisfactory material are given, for illustration.

2040 Protective Coatings. Harry Burrell. *Chemical and Engineering News*, v. 30, Jan. 7, 1952, p. 32-33.

Annual review of new developments. New methods of applying paint are emphasized.

2041* Paint, Surface Finish and Design. L. A. Jordan. *Chemistry & Industry*, Nov. 17, 1951, p. 981-987.

Surveys the above. Causes of adhesion failure of paint films applied by spray are discussed as well as other factors concerned with spraying.

2042* Heat-Reflecting Paints. F. Hoffmann. *Coke and Gas*, v. 13, Dec. 1951, p. 441, 443.

Presents results of an investigation on the absorption, trans-

mission, and reflection of heat of 5 paints. Experiments showed that pigment paints were good reflectors of infrared radiation.

2043* The Flocculation of Pigment Suspensions. R. G. Kinsman and R. F. Bowles. *Journal of the Oil & Colour Chemists' Association*, v. 34, Dec. 1951, p. 592-610; disc., p. 610.

Attempts to isolate flocculation as a phenomenon and to examine critically and correlatively the methods currently used for its assessment. Two distinct types of flocculation are observable and no method seems universally applicable to the measurement of the effect. Data are graphed and tabulated. 70 ref.

2044 Fish Oils in the Paint Industry. G. T. Bray. *Paint Manufacture*, v. 21, Dec. 1951, p. 452-454.

Describes fish oils which can be used to replace linseed oil in paints and varnishes. Covers production methods.

2045* Vinyls for Surface Coatings. Part V. Walter J. Hanau. *Paint and Varnish Production*, v. 41, Dec. 1951, p. 14-19, 36-37.

Discusses such factors as vinylidene chloride polymers, polyvinyl chloride, polyblends, latices, chloride-acetate copolymers, vinyl-type finishes and coatings, and organosols and plastisols. 29 ref.

See also:
1513 (paint studies by electron microscope)
1919 (pigment-oil suspensions)
1983 (styrenated oils in surface coatings)
2011 (phenolic-resin varnishes)
2284 (vinyl-resin coatings)

31. AGRICULTURAL RESEARCH

2046* New Method of Experimentation in the Field. (In French.) Andre Hamy. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 23, Nov. 26, 1951, p. 1389-1390.

Presents a new experimental method applicable to all soils, the principle of which consists in determining the results of different treatments on a single piece of land by eliminating the difficulties inherent to the variation of the soils.

2047* Recent British Developments in Taint-Free Use of BHC. E. Holmes. *Agricultural Chemicals*, v. 6, Dec. 1951, p. 31-33, 113, 115.

Surveys the above. Areas of research were in developing gamma-Benzene Hexachloride formulations, in using gamma-BHC in new techniques and in using even crude BHC for certain purposes according to carefully timed schedule.

2048* New Material Concerning Leaf Feeding of Plants. (In Russian.) F. F. Matsov and M. S. Klishchevskaia. *Doklady Akademii Nauk SSSR*, new ser., v. 78, June 11, 1951, p. 959-962.

Presents results of experiments on effects of spraying with solutions of P, B, and Mn on the yield of esparto grass seed; and with solutions of B, Mn, and Zn on the yield of lucerne seed. Data are tabulated.

2049* Certain Peculiarities in the Fertilization of Different Varieties of Spring Wheat. (In Russian.) I. V. Mosolov and A. V. Panova. *Doklady Akademii Nauk SSSR*, new ser., v. 78, June 11, 1951, p. 963-966.

Three varieties of spring wheat were fertilized by different combinations of NH_4NO_3, superphosphate, and KCl. Total plant weights and grain yields were measured. Data are tabulated and discussed.

2050* The Influence of Azotobacteria on the Oxidation-Reduction Potential of Plant Cells. (In Russian.) I. A. Geller and E. G. Khariton. *Doklady Akademii Nauk SSSR*, new ser., v. 78, June 11, 1951, p. 1041-1043.

The effect of treating seeds of sugar beets and spring wheat with nitrogen-fixing bacteria were tested on check plots. Values of pH, Eh, and rH of the plants and soil are discussed and tabulated.

2051* Absorption of Mineral Elements by Forage Plants: III. The Relation of Stage of Growth to the Micronutrient Element Content of Timothy and Some Legume. Kenneth C. Beeson and H. A. MacDonald. *Agronomy Journal*, v. 43, Dec. 1951, p. 589-593.

The Co, Cu, Mn, and Fe contents of birdsfoot trefoil, Ladino clover, alfalfa, and timothy were determined at 4 stages of growth. Results are charted, tabulated, and discussed.

2052* Limitations in the Use of Electrical Resistance Soil Moisture Units. H. A. Weaver and V. C. Jamison. *Agronomy Journal*, v. 43, Dec. 1951, p. 602-605.

Nylon and Fibreglas electrical soil-moisture units were found to approximately reproduce resistance at recurring tensions when soil conditions were held constant. Preliminary tests using NaCl solutions alone indicated marked sensitivity of the fabric units to changes in salt concentration. Subsequent tests showed that resistance of both units decreased appreciably with each increase in salt concentration at tensions between 0 and 15 atm.

2053 Determination of Copper and Zinc in Soils or Plants. R. G. Menzel and M. L. Jackson. *Analytical Chemistry*, v. 23, Dec. 1951, p. 1861-1863.

Copper and Zn in soils or plants are determined by a comparatively simple procedure involving extraction as the dithizone complex with final estimation in the same solution by means of a single polarogram. 10 ref.

2054* Potassium in Animal Nutrition. J. W. Turrentine. *Better Crops With Plant Food*, v. 35, Dec. 1951, p. 23-25, 39-41.

Discusses the role of K in biological processes. Includes a brief discussion of the 3 potassium isotopes, and presents theories on the function of K in the living cell.

2055 Synthetic Polyelectrolyte Improves Soil Structure, Prevents Erosion. *Chemical and Engineering News*, v. 29, Dec. 31, 1951, p. 5530-5531.

New product of Monsanto Chemical Co. called Krilium is the sodium salt of hydrolyzed polyarcylonitrile. It is a synthetic replacement for the natural polysaccharide or polyuronide resins which stabilize the structure of soil conditioned with humus or manure. It promotes plant growth apparently by bonding ultimate soil particles into water-stable aggregates. Secondary benefits are increased aeration, improved water relationships, and better workability. In cases of very poor soil structure, yields of vegetables and root crops can be doubled, tripled, or increased as much as 10-20 times. The synthetic conditioner will permit rejuvenation of much land equipped with irrigation systems in the West.

2056 Magnesium as a Plant Nutrient. H. Trefor Jones. *Chemistry & Industry*, Dec. 15, 1951, p. 1108-1110.

Discusses evidence and evaluates theories regarding the role of Mg in soil and plant life. Describes effects resulting from its presence and absence. 19 ref.

2057 The Use of Isotopes in Agricultural Research. I and II. P. A. Collier and A. J. Low. *Chemistry & Industry*, Dec. 22, 1951, p. 1122-1128.

Presents a brief survey on the above. 21 ref.

2058 Nitro Alkane Derivatives Related to DDT. H. B. Hass, M. B. Neher, and R. T. Blickenstaff. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2875-2878.

The compounds described were synthesized as a test of Mullers theory for DDT and many proved to be more effective. 1,1-bis-p-chlorophenyl-2-nitropropane and the corresponding butane derivative are 5 times as effective for thrips on beans and aphids on okra, and the ratio of activity to toxicity for warm-blooded animals is about 10 times as favorable. 12 ref.

2059* Effects Associated With Toxicity and Plant Translocation of Three Phosphate Insecticides. Mahmoud M. I. Zeid and L. K. Cutkomp. *Journal of Economic Entomology*, v. 44, Dec. 1951, p. 898-905.

Presents results of preliminary greenhouse-laboratory experiments, on the action of octhamethyl pyrophosphoramide. Involves the application of the insecticides to aerial or vegetative portions of the plants. Comparisons were largely made between octamethyl pyrophosphoramide, para-oxon and parathion.

2060* Methods for Evaluation of Cotton Insecticides. M. D. Farrar and John K. Reed. *Journal of Economic Entomology*, v. 44, Dec. 1951, p. 943-945.

By use of the vacuum-duster technique, various cotton dusts were compared under laboratory conditions against the adult boll weevil. Includes descriptions of apparatus and techniques.

31. *Agricultural Research*

2061* Studies on Plant Growth-Regulating Substances. IV. The Activity of Certain Aryloxy Acids for Inducing Rooting and for Tomato Setting. Daphne J. Oxborne, R. L. Wain, and Ruth D. Walker. *Journal of Horticultural Science*, v. 27, Jan. 1952, p. 44-52.

A wide range of synthetic chemicals has been prepared and examined for activity in promoting the rooting of cuttings and for inducing seedless development of tomato fruits. The results are examined and it is shown that in the main they conform to suggestions previously put forward concerning growth-regulating activity in relation to chemical structure.

2062* The Application of Silicate Bacteria to the Roots of Cotton Plants. (In Russian.) V. G. Aleksandrov. *Doklady Vsesoiuznoi Ordena Lenina Akademii Sel'skokhozaistvennykh Nauk imeni V. I. Lenina*, v. 16, no. 5, 1951, p. 25-33.

The influence of the above on the growth and yield of cotton was determined experimentally. Results are tabulated and charted.

2063* Investigations on Organic Fungicides. IV. Chemical Constitution and Fungistatic Activity of Dithiocarbamates, Thiuram Sulphides and Structurally Related Compounds. V. Chemical Constitution and Fungistatic Activity of Aliphatic Bisdithiocarbamates and Isothiocyanates. (In English.) H. L. Klöpping and G. J. M. Van Der Kerk. *Recueil des Travaux Chimiques des Pays-Bas*, v. 70, Nov. 1951, p. 917-939, 949-961.

60 references.

Books

2064 Alkali Soils; Their Formation, Properties and Reclamation. W. P. Kelley. 176 pages. 1951. Reinhold Publishing Corp., New York. (S595 K29a)

Surveys the above. Covers the origin and accumulation of salts in soils, effects of salts, soluble salts and exchangeable basis of alkali soils, irrigation in relation to alkali soils, and alkali soils in relation to plant growth. 8-page bibliography.

2065 Mineral Nutrition of Plants. Emil Truog, editor. 469 pages. 1951. University of Wisconsin Press, Madison, Wis. (QK867 W75m)

Includes 18 papers by various authors on the following broad topics: mineral nutrition of plants; physico-chemical and biological factors affecting nutrient availability in soils; mechanism of entry and translocation of mineral nutrients in plants; field problems in plant nutrition; role of minerals in plant nutrition; and modifying influences of various environmental factors upon mineral nutrition.

See also:

1452 (organic phosphorus insecticides—determination)
1454 (residues of fungicides on food—determination)
1459 (determination of DDT residues)
1517 (grading agricultural products by spectro-photometry)
1814 (USDA regional research laboratories)
2343 (toxic materials in agriculture)

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2066* Peculiarities of the Transonic Range and the Problem of the Minimum Resistance Profile at Supersonic Speeds. (In French.) Dimitri Riabouchinsky. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 23, Nov. 26, 1951, p. 1330-1333.

A mathematical comparative study of results of experiments on the above is presented.

2067* Existence of Spontaneous Discharge Limit for Copper Ions on Metallic Zinc. (In French.) Marguerite Bancie-Grillot and Edmond Grillot. *Comptes Rendus hebdomadaires des Séances de l'Academie des Sciences*, v. 23, Nov. 26, 1951, p. 1362-1364.

Describes detection of Cu^{++} ions by use of Cu^{64}; and application to the study of the spontaneous discharge of Cu^{++} ions on Zn, in order to control the preparation of luminescent ZnS free of Cu.

2068* Luminescence of Phosphorus in Strong Electrical Fields. (In German.) A. Herwelly. *Acta Physica Austriaca*, v. 5, Nov. 1951, p. 30-44.

Describes experiments which show that a phosphor luminesces in a strong electrical field only when light rays are emitted from a glow discharge or from emission of electrons. The existence of actual electro-lumimescence is disproved. Diagrams and photographs are presented. 14 ref.

2069* New Types of Discharge in Magnetic Fields. (In German.) Karl Siebertz. *Acta Physica Austriaca*, v. 5, Nov. 1951, p. 134-147.

A luminous discharge is shown to occur only on the surface of a cathode coated with a thin film of some good insulator. The phenomenon is explained as an effect which can be explained by the laws of gas discharges. Includes diagrams and references.

2070* New Varieties of Barium Titanate Monocrystals. (In Russian.) I. N. Beliaev, N. S. Novosil'tsev, A. L. Khodakov, and E. G. Fesenko. *Doklady Akademii Nauk SSSR*, new ser., v. 78, June 11, 1951, p. 875-877.

Describes two varieties of the above similar in their chemical composition, but having different dielectric properties, which depend on conditions of their growth. Methods of growth are described. Data are charted.

2071* Systematic Theory of Electrically Charged Particles. (In Russian.) A. E. Glauberman. *Doklady Akademii Nauk SSSR*, new ser., v. 78, June 11, 1951, p. 883-885.

Critically analyzes theoretical method of investigation of the above proposed by N. N. Bogolubov. A possible modification of this method is indicated, permitting a closer approximation to experimental facts.

2072* Ferrites of Bivalent Metals. (In Russian.) G. A. Smolenskii. *Doklady Akademii Nauk SSSR*, new ser., v. 78, June 11, 1951, p. 921-924.

The magnetic properties of ferrites and mixed ferrites of Mg, Mn, Ni, Cu, Cd, and Zn having the general formula (Ni, Zn) Fe_2O_4 were determined experimentally. Data are tabulated and charted. 11 ref.

2073* Theory of the Diffusion Process in Moving Liquids (Hydrodynamics at High Prandtl Numbers). V. G. Levich. *Doklady Akademii Nauk SSSR*, new ser., v. 78, June 21, 1951, p. 1105-1108.

The above is discussed and calculations of the transfer coefficient are made for various conditions of flow. Results are tabulated. 11 ref.

2074* Absorption and Emission Spectra of Zinc Oxide. K. V. Shalimova. *Doklady Akademii Nauk SSSR*, new ser., v. 78, June 21, 1951, p. 1127-1130.

The influence on the above of varying amounts of excess zinc atoms and of varying the thickness of the oxide film are investigated. Data are discussed and charted.

2075* Ferroelectric Properties of Certain Solid Solutions. (In Russian.) G. A. Smolenskii, M. A. Karamyshev, and K. I. Rozgachev. *Doklady Akademii Nauk SSSR*, new ser., v. 79, July 1, 1951, p. 53-56.

Electrostriction and dielectric permeability of solid solutions of $BaTiO_3$-$BaZrO_3$ and $BaTiO_3$-$BaSnO_3$ were measured. Data are tabulated and shown graphically. Analogous systems are discussed briefly.

2076 One- and Two-Dimensional X-Ray Diffraction. B. D. Cullity. *American Journal of Physics*, v. 19, Dec. 1951, p. 500-506.

The basic theory of X-ray diffraction is first presented for the case of a 3-dimensional crystal and then extended to crystals consisting only of a plane of atoms one layer thick or of a linear chain of atoms. Intermediate cases are considered and experimental methods of observing these phenomena discussed

2077* Steam Heat Transfer to Small Drops of Water. S. Weinberg and G. and J. Weir. *British Journal of Applied Physics*, v. 2, Dec. 1951, p. 363-366.

Presents mathematical analysis of above.

2078 Preparation and Use of Phosphor Single Crystals. Peter D. Johnson. *Ceramic Age*, v. 58, Nov. 1951, p. 32-36.

Surveys the above. Some of the types of measurements which are made using these crystals are mentioned and a few experimental results which introduce concepts are discussed. 16 ref.

2079 Relationship Between the Crystal Structure and Magnetic Properties of the Ferrites. Lawrence R. Bickford, Jr. *Ceramic Age*, v. 58, Nov. 1951, p. 36-41.

Shows how the salient features of the dependence of saturation magnetization of ferrites on chemical composition and thermal treatment can be consistently explained on the basis of Neel's theory. The properties of the different ferrites are explained in terms of the distribution of cations on the available sites, by regarding the cations as carriers of magnetic moments. This distribution is affected by composition and thermal treatment. Data are tabulated and graphed.

2080 Ferroelectric Crystals. Walter J. Merz. *Ceramic Age*, v. 58, Nov. 1951, p. 42-45.

Presents a summary of the properties of $BaTiO_3$ to illustrate the characteristics of ferroelectrics. Some applications of this type crystal in ceramics is given.

2081 Effect of Impurities Upon the Dielectric Properties of Barium Titanate. R. G. Graf. *Ceramic Age*, v. 58, Dec. 1951, p. 16, 18-19.

Illustrates some of the possibilities in altering the properties of $BaTiO_3$ dielectric bodies through control of the impurities in, or additions to, the material.

2082* Photoviscosity of Glycerine Proves Useful Tool in Flow Studies. W. W. Hagerty and R. A. Yagle. *Civil Engineering*, v. 21, Dec. 1951, p. 38-40.

Discusses the above applied to the study of flows at low Reynolds numbers, development of secondary motions, and development of instabilities in a flow regime.

2083* Determination of the Piezoelectric Constants of Some Isomorphous Crystals. F. P. Spitzer. *Electrical Communications*, v. 28, Dec. 1951, p. 300-304.

Describes a search for substances having a positive Giebe-Scheibe effect and presents results of determination of the piezoelectric constants of those that show this effect to a high degree. The search for suitable substances having strong piezoelectric effects is well justified by the fact that quartz and Rochelle salt crystals, used hitherto exclusively for technical purposes, are not adequate for all possible applications.

2084* A Magnetic Store for High-Speed Digital Computers. *Engineer*, v. 192, Dec. 7, 1951, p. 737-738. (Based on paper by F. C. Williams, T. Kilburn and G. E. Thomas.)

Discusses the above. Briefly the store consists of a rotating cylindrical drum coated with magnetic material. Diagrams.

2085 The Accuracy of Infra-Red Intensity Measurements. A. E. Martin. *Transactions of the Faraday Society*, v. 47, Nov. 1951, p. 1182-1191.

Theoretical and mathematical treatment of the above.

2086* Research on the Friction Index of "Naturally" Roughened Tubes. (In German.) Fritz Herning. *Gas- und Wasserfach*, v. 92, Nov. 15, 1951, p. 289-295.

Experiments made over a wide range of Reynolds numbers show that a naturally roughened tube has a very different friction index than an artificially roughened one. Work is applicable to flow of fluids in pipes. Includes graphs, diagrams, photographs, and tubes.

2087* Difference in Dielectric Constants Between a "Free" and a Clamped KH_2PO_4 Crystal. (In French.) H. Baumgartner. *Helvetica Physica Acta*, v. 24, Sept. 20, 1951, p. 326-329.

Above is briefly explained and graphically illustrated.

2088* Magnetism of "Free" Charge Carriers in Semiconductors. (In German.) G. Busch and E. Moser. *Helvetica Physica Acta*, v. 24, Sept. 20, 1951, p. 329-331.

Brief discussion of above subject.

2089* Is the Seignette-Electric 120°C. Transformation of Barium Titanate of the First or Second Type? (In German.) W. Känzig and N. Maikoff. *Helvetica Physica Acta*, v. 24, Sept. 20, 1951, p. 343-356.

The phenomenological theory of Devonshire predicts that the ferroelectric 120°C. transition of $BaTiO_3$ is of the first kind. In order to prove this theory, the effect of a biasing field on the dielectric constant of single-domain-crystals was investigated in the range from 20 to 180°C. Experimental results confirm the theory. The 120°C. transiiton appears to be an adiabatic transition of the first type. 12 ref.

2090 Potential Importance of Ultrasonic Energy to Industrial Processes. J. W. Butterworth. *Instruments*, v. 24, Dec. 1951, p. 1422-1423.

Discusses ultrasonic energy, transducers, and their future potentialities. Includes schematic diagrams of transducers.

2091* Some Physical and Chemical Properties of Ultrasonic Cavitation. (In French.) Pierre Renaud. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 48, July-Aug. 1951, p. 336-338.

Discusses briefly tests made on the ultrasonic sensitivity of explosives and the chemical effects of cavitation. 21 ref.

2092 Anomalous Variation of Young's Modulus of Antiferromagnetics at the Néel Point. R. Street and B. Lewis. *Nature*, v. 168, Dec. 15, 1951, p. 1036-1037.

Measurements were made on the variation of Young's modulus of two antiferromagnetic materials, nickel oxide and cobalt oxide, over ranges of temperature which include their Néel temperatures. Results are charted and discussed.

2093 Heat Transfer and Pressure Drop in Fixed Beds of Spherical and Cylindrical Solids. Part I. Pressure Drop and Packed Bed Characteristics. John M. Campbell and R. L. Huntington. *Petroleum Refiner*, v. 30, Dec. 1951, p. 127-133.

Presents original data and correlations for predicting the pressure drop and physical characteristics of common heat-transfer packing materials. Particular emphasis is placed on the effect of chamber diameter. Tables and graphs. 24 ref. (To be continued.)

2094* Dislocations in Thin Plates. J. D. Eshelby and A. N. Stroh. *Philosophical Magazine*, ser. 7, v. 42, Dec. 1951, p. 1401-1405.

A mathematical treatment.

2095* Thermal Convection in a Magnetic Field. W. B. Thompson. *Philosophical Magazine*, ser. 7, v. 42, Dec. 1951, p. 1417-1432.

The modifications produced in the Rayleigh-Jeffreys theory of slow thermal convection by magneto-hydrodynamic effects in a conducting fluid placed in a magnetic field are examined. An estimate of the critical gradient is made for somewhat artificial boundary conditions and it is found large enough to be experimentally detectable. The applicability of Jeffreys' method of marginal stability is discussed and the nature of possible oscillations investigated. 13 ref.

2096* The Boundary Layer in Three Dimensional Flow. Part II. The Flow Near a Stagnation Point. L. Howarth. *Philosophical Magazine*, ser. 7, v. 42, Dec. 1951, p. 1433-1440.

The equations of boundary layer flow in the vicinity of a stagnation point on a general (3-dimensional) surface are discussed and shown to be reducible to a pair of simultaneous ordinary 3rd-order differential equations containing a single parameter determined by the mainstream flow.

2097 Resonance-Region Neutron Spectrometer Measurements on Silver and Tungsten. W. Selove. *Physical Review*, ser. 2, v. 84, Dec. 1, 1951, p. 869-876.

Reports and discusses the first measurements of the resonance region time-of-flight spectrometer for measurements of neutron-transmission properties. One of the principal advantages of this instrument is that comparatively small samples are required, and measurements can be made on many comparatively rare materials.

2098 Field-Dependent Secondary Emission. Harold Jacobs. *Physical Review*, ser. 2, v. 84, Dec. 1, 1951, p. 877-884.

Describes a method whereby field-enhanced secondary emission surfaces of MgO can be constructed reproducibly and are stable

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over considerable periods of time. Currents as high as 10 milliamp. per sq. cm. can be drawn without immediate deterioration, and tests extended for several weeks on the same samples. The potential at the surface of the sample can be estimated while, at the same time, potentials of the base metal are measured.

2099 Total Neutron Cross Sections of Cobalt, Manganese, and Molybdenum. Warren Fenton Subbins. *Physical Review*, ser. 2, v. 84, Dec. 1, 1951, p. 902-905.

Gives experimental procedure and results of measurement of the above. Graphs.

2100 The Stopping Power of Metals and Semiconductors. Z. H. Heller and D. J. Tendam. *Physical Review*, ser. 2, v. 84, Dec. 1, 1951, p. 905-909.

Presents results of a study of the dependence of nuclear radiation stopping power on velocity and atomic number. An empirical formula derived from these data expresses the electronic stopping power relative to Al as a function of energy and atomic number over a wide range.

2101 Neutron Scattering and Polarization by Ferromagnetic Materials. C. G. Shull, E. O. Wollan, and W. C. Koehler. *Physical Review*, ser. 2, v. 84, Dec. 1, 1951, p. 912-921.

Deals with studies of intensity distribution and polarization of the scattered neutron radiation from both unmagnetized and magnetized ferromagnetic substances. Gives information on form factor dependence of magnetic scattering, on the basic nature of the neutron's magnetic interaction and on magnetic structure existing in certain ferromagnetics.

2102 On Shock-Wave Phenomena; Refraction of Shock Waves at a Gaseous Interface. H. Polachek and R. J. Seeger. *Physical Review*, ser. 2, v. 84, Dec. 1, 1951, p. 922-929.

The governing equations are formulated and analyzed. Continuous families of solutions are obtained numerically for a number of gas combinations at varying angles of incidence on a plane interface between ideal gases. Significant features of the present solutions are: regular refraction (3-wave configuration at the interface) does not occur at glancing incidence, and in the region of regular refraction there is no "total reflection" of finite shock waves.

2103 Response of Some Scintillation Crystals to Charged Particles. C. J. Taylor, W. K. Jentschke, M. E. Remley, F. S. Eby, and P. G. Kruger. *Physical Review*, ser. 2, v. 84, Dec. 1, 1951, p. 1034-1043.

Dependence of the response of anthracene, stilbene, and sodium iodide crystals in a scintillation detector on type and energy of charged particles incident on the crystal was investigated. With the exception of protons and deuterons in NaI, which gave a linear response over the entire energy region investigated, plots of pulse height vs. energy for heavy particles gave a nonlinear relation for low energies tending toward linearity with increasing particle energy. Data were obtained on the response of the crystals to electrons in the low-energy region (500-5000 ev.) using a specially fabricated pulsed electron gun, while for a higher energy region (27-624 kev.), the electrons were supplied by internal conversions and x-rays from radioactive sources.

2104 An Anomalous Effect in the Ultrasonic Absorption of Electrolytic Solution. Robert E. Barrett and Robert T. Beyer. Physical Review, ser. 2, v. 84, Dec. 1, 1951, p. 1060-1062.

Presents experimental results supporting the hypothesis that the absorption coefficient is not the sum of the coefficient due to the solvent alone and that due to the solute.

2105 Theoretical Spectra of Luminescent Solids. Ferd E. Williams and Malcolm H. Herb. *Physical Review*, ser. 2, v. 84, Dec. 15, 1951, p. 1181-1183.

From the potential energy curves for the ground and excited states of the Tl activator in KCl, the absorption spectrum of this phosphor was calculated by direct evaluation of the matrix elements for electronic transitions between the individual vibrational levels of the initial and final states. Harmonic oscillator wave functions in the initial state and wave functions for a linear potential in the final state are used. Results verify the classical and semi-classical spectra previously reported, and provide a new insight into application of the Franck-Condon principle to solid-state luminescence.

2106 Shot Noise in Germanium Single Crystals. G. B. Herzog and A. Van Der Ziel. *Physical Review*, ser. 2, v. 84, Dec. 15, 1951, p. 1249-1250.

Excess noise of thin single-crystal Ge filaments was measured over the range 1-1600 Kc. by connecting the filaments to the input of a sensitive selective amplifier and measuring the noise ratio of the filament. Results are charted and discussed.

2107 Removal of Space Charge in Cadmium Sulfide Crystals and Their Conduction Properties Under Electron Bombardment. R. Ramanna and Ved Prakash Duggal. *Physical Review*, ser. 2, v. 84, Dec. 15, 1951, p. 1251-1252.

Single crystals of CdS were grown by the methods used by Frerichs. Space-charge formation in these crystals was studied, and it was found that counting rate decreased rapidly with time, the effect being greater at lower fields across the crystal. Heating effects and conduction properties under electron bombardment were also studied.

2108 Spectral Dependence of Thermionic Emmission From (Ba-Sr)O Cathodes Over the Visible Region. Tadatosi Hibi and Kazuo Ishikawa. *Physical Review*, ser. 2, v. 84, Dec. 15, 1951, p. 1252.

Data are charted.

2109 Electric Forming of n-Germanium Transistors Using Donor-Alloy Contacts. R. L. Longini. *Physical Review*, ser. 2, v. 84, Dec. 15, 1951, p. 1254.

A brief discussion.

2110 Ultrasonic Relaxation Processes in Pure Liquids. J. H. Andreae and John Lamb. *Proceedings of the Physical Society*, v. 64, sec. B, Dec. 1, 1951, p. 1021-1031.

Assumptions made by Hall and Herzfeld in previous theories of ultrasonic absorption are interpreted on the basis of a new and more general analysis. A new relation is derived, which provides a satisfactory explanation of the observed relaxation effects in those liquids which have been studied.

2111 Self-Magnetic Field in High Current Discharges. M. Blackman. *Proceedings of the Physical Society*, v. 64, sec. B, Dec. 1, 1951, p. 1039-1045.

An investigation of Tonk's theory of the above. Influence of the parameters describing the discharge conditions is considered in some detail.

2112 Ultrasonic Absorption in Supercooled Liquids. A. N. Hunter. *Proceedings of the Physical Society*, v. 64, sec. B, Dec. 1, 1951, p. 1086-1087.

Graphs and brief discussion of experiments on the above.

2113 The Optical Constants of Lead Sulphide and Lead Telluride in the Region 0.5-3 Microns. D. G. Avery. *Proceedings of the Physical Society*, v. 64, sec. B, Dec. 1, 1951, p. 1087-1088.

Discusses method of measurement of the above. Results are charted and discussed.

2114 Field Dependence of the Dielectric Constant. J. J. O'Dwyer. *Proceedings of the Physical Society*, v. 64, sec. A, Dec. 1, 1951, p. 1125-1132.

Mathematical treatment and theoretical analysis of the above. Extends Fröhlich's calculation one step further to include the first term in the field dependence of the dielectric constant. The general theory is applied to Kirkwood's model for a dipolar liquid. To preserve continuity of argument, much of Fröhlich's work is reproduced.

2115* Two-Dimensional Airfoils in Shear Flow. I. D. G. James. *Quarterly Journal of Mechanics and Applied Mathematics*, v. 4, Dec. 1951, p. 407-418.

The method adopted is illustrated by means of a simple example which also serves as a comparison with the results of other authors. The case of the general cylinder fixed at an arbitrary point in the field of flow is considered next; and the components of the force and the couple are obtained.

2116* The Flow of Two Adjacent Plane Supersonic Jets Past Flat-Plate Wings. II. M. Holt. *Quarterly Journal of Mechanics and Applied Mathmatics*, v. 4, Dec. 1951, p. 419-431.

The method of determining the pressure distribution on delta wings in a non-uniform supersonic stream developed in Part I is extended to include wings on which subsonic conditions apply along part or the whole of the leading edge.

2117* Heat Conduction in the Region Bounded Internally by an Elliptical Cylinder and an Analogous Problem in Atmospheric Diffusion. C. J. Tranter. *Quarterly Journal of Mechanics and Applied Mathmatics*, v. 4, Dec. 1951, p. 461-465.

2118* The Effect of Finite Width of Area on the Rate of Evaporation Into a Turbulent Atmosphere. D. R. Davies and T. S. Walters. *Quarterly Journal of Mechanics and Applied Mathmatics*, v. 4, Dec. 1951, p. 466-480.

2119* The Performance Theory and the Design Procedure of the Laminated Magnetostriction Vibrators. (In English.) Yoshimitsu Kikuchi and Koki Fukushima. *Science Reports of the Research Institutes, Tohoku University*, ser. B, v. 1-2, Jan. 1951, p. 141-189.

Theoretical investigations were made of the performance of the above apparatus for emitting ultrasonic waves in water and other liquids. Calculation formulas for the resonance frequency and mechanical and electrical constants of the rectangular- and ring-type vibrators are given.

2120* On the Magnetic Hysteresis Losses in Magnetostriction Vibration. Yoshimitsu Kikuchi and Hiroshi Shimizu. *Science Reports of the Research Institutes, Tohoku University*, ser. B, v. 1-2, Mar. 1951, p. 365-379.

Theoretical analysis is followed by results of experiments on symmetrical and unsymmetrical magnetic hysteresis losses of Ni under various tensions. Graphs and diagrams.

2121* Certain Questions on the Intensity of Spectral Lines. (In Russian.) S. E. Frish. *Uspekhi Fizicheskikh Nauk*, v. 43, Apr. 1951, p. 512-535.

Various aspects of the above are discussed and treated mathematically. 14 ref.

2122* Triboluminescence of Arsenic. (In German.) I. N. Stranski, E. Strauss, and G. Wolff. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie*, v. 55, Oct. 1951, p. 633-636.

Experiments show that the grinding of As crystals results in the emission of light flashes; that the total amount of emitted light varies with production conditions, storage temperature, and age of the crystals; and that the spectrum of the emitted light covers the entire visible range to far into the ultraviolet range. It is assumed that the luminescence is caused by a special type of lattice distortion. Includes a diagram and graph.

2123* Mechanism of Magnetic Breaks. (Preliminary Report). (In German.) Th. Hofbauer and K. M. Koch. *Zeitschrift für Physik*, v. 130, Oct. 9, 1951, p. 409-414.

Experiments show that an auxiliary field of higher frequency promotes formation and course of magnetic breaks and thus increases saturation magnetization and remanence. Results of experiments on Ni wire and on Fe-Ni sheet are described and shown by means of oscillograms.

2124* Study of Thin Absorbent Layers With the Aid of the Absolute Phase. (In German.) Herwig Schopper. *Zeitschrift für Physik*, v. 130, Nov. 13, 1951, p. 565-584.

Discusses both old and new methods of determining optical constants and layer thickness and shows that the assumption that spatially dispersed globules form the layers will not explain the behavior of thin metal layers, but that experimental and theoretical results agree when it is assumed that the layers are composed of spheroids and that their axial ratios are statistically distributed about a probable value. Includes graphs and tables. 20 ref.

2125* Measuring the Temperature Distribution in the Interior of a Wall-Stabilized Arc With the Aid of the Radioactive Mercury Isotope Hg^{203}. (In German.) Günter Ecker. *Zeitschrift für Physik*, v. 130, Nov. 13, 1951, p. 585-604.

A new method of determining gradient, pressure, wall temperature, and temperature distribution is described, and results are shown to agree with theoretical and experimental predictions. Includes diagrams and graphs. 51 ref.

2126* Time and Temperature Dependence of Intensity Disymmetry in the Hydrogen Stark Effect. (In German.) Rudolf Gebauer and Günther Ohl. *Zeitschrift für Physik*, v. 130, Nov. 13, 1951, p. 605-620.

Describes theoretical and experimental investigation of the above. Diagrams and graphs. 10 ref.

2127* Energy Loss of Energy-Rich Electrons in Thin Layers. (In German.) O. Blunck and K. Westphal. *Zeitschrift für Physik*, v. 130, Nov. 13, 1951, p. 641-649.

The distribution of energy loss of rapid electrons by ionization and radiation was calculated on the assumption that the electrons pass only through "thin" layers, i.e., that the average energy loss is small as compared to the homogeneous incident energy. Data are tabulated and graphed.

2128* Distribution of Metal Ions in the Spinel Lattice and Its Effect on Physical Properties. (In German.) E. J. W. Verwey, P. B. Braun, E. W. Gorter, F. C. Romeijn, and J. H. van Santen. *Zeitschrift für physikalische Chemie*, v. 198, nos. 1-4, Oct. 1951, p. 6-22.

After discussing radiographically determined cation distribution in various oxide spinels, normal and inverted spinels are discussed. Electrical properties of ferrite spinel agree with earlier theories, and the ferromagnetic saturations of simple spinels can be explained by Néel's theory. Includes a diagram, graphs, and tables. 41 ref.

2129* Some Conduction Properties of the Oxides of Zinc and Copper. (In English.) C. A. Hogarth. *Zeitschrift für physikalische Chemie*, v. 198, nos. 1-4, Oct. 1951, p. 30-40.

Electrical conductivity and thermoelectric power of ZnO and Cu_2O were measured as functions of both temperature and oxygen pressure, and were found to be in general agreement with theories previously proposed. Measurements of the thermoelectric power of CuO indicate that this substance is an excess semiconductor, but its variation with oxygen pressure is in the opposite sense to that expected for such a material. Possible reasons for the discrepancies between theory and experiment are offered. 13 ref.

2130* Activation Energy of Impurity Semiconductors. (In German.) H. K. Henisch. *Zeitschrift für physikalische Chemie*, v. 198, nos. 1-4, Oct. 1951, p. 41-51.

Discusses problems in evaluation and explanation of above and proposes a series of desirable experiments. Includes diagrams. 19 ref.

2131* Local Resistance Drop in Irradiated Photoelectric Semiconductors. (In German.) H. Müser. *Zeitschrift für physikalische Chemie*, v. 198, nos. 1-4, Oct. 1951, p. 52-60.

Theoretical and experimental study shows that local illumination of a light-sensitive semiconductor yields mathematically different effects, depending on whether the photoelectric effect is described either as separation of bonded electrons or as a facilitation of transition between grain boundaries of a polycrystalline layer. Includes diagrams and graphs.

2132* Localized Electronic States in Bombarded Semiconductors. (In English.) Hubert M. James and Karl Lark-Horovitz. *Zeitschrift für physikalische Chemie*, v. 198, nos. 1-4, Oct. 1951, p. 107-126.

Bombardment of Ge and Si with fast x-particles, deuterons, neutrons, or electrons produces striking changes in the electrical and optical properties of these materials. Bombardment of n-type Ge produces a decrease in conductivity which finally passes through a minimum and begins to increase after the material has become p-type; bombarded p-type Ge shows a monotonic increase in conductivity unless it is initially very high. This behavior is explained by the assumption that the bombardment produces more acceptors than donors in the material. On the other hand, bombarded Si, whether of n-type or p-type, shows monotonically increasing resistance; attributed to introduction of both electron traps and hole traps by the bombardment. Attempts to develop a more complete basis for the understanding of these and other properties of bombarded semiconductors. 23 ref.

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2133* Inert Capacitance Changes of Selenium Rectifiers and Ionization Equilibrium of Impurity Centers. (In German.) K. Lehovec and O. Imalis. *Zeitschrift für physikalische Chemie*, v. 198, nos. 1-4, Oct. 1951, p. 127-146.

Describes method of measuring capacitance changes and explains results by assuming an ionization equilibrium of impurity centers at the Se surface. Includes graphs and tables. 19 ref.

2134* The Electrical Properties of Cuprous Iodide. (In English.) Benjamin H. Vine and Robert J. Maurer. *Zeitschrift für physikalische Chemie*, v. 198, nos. 1-4, Oct. 1951, p. 147-156.

Electrical conductivity and Hall coefficient of cuprous iodide containing excess iodine were measured as functions of temperature and of pressure of iodine vapor in equilibrium with the compound. Cuprous iodide containing excess iodine is a defect conductor. The concentration of free holes and their mobility depend upon temperature and concentration of excess iodine. 12 ref.

2135* Tarnishing Reaction of Sulfur With Bromine and Silver in Silver-Containing Silver-Bromide Crystals. (In German.) L. Jung, O. Stasiw, and J. Teltow. *Zeitschrift für physikalische Chemie*, v. 198, nos. 1-4, Oct. 1951, p. 186-199.

Experimental and theoretical study of above was made to demonstrate Wagner's theory on migration of ions and of deficit and excess electrons, to study effect of external conditions on tarnishing rate, and to secure experimental data on Schottky-Wagner's disorder theory. Includes photographs, tables, and graphs. 14 ref.

2136* Temperature Dependence of the Photoelectric Conductivity of CdS. (In German.) E. A. Niekisch and R. Rompe. *Zeitschrift für physikalische Chemie*, v. 198, nos. 1-4, Oct. 1951, p. 200-214.

Attempts to explain mechanism of above effect. Data are charted. 15 ref.

2137* The Atomic Theory and the Band Model of Crystals. (In German.) F. Stöckmann. *Zeitschrift für physikalische Chemie*, v. 198, nos. 5-6, Oct. 1951, p. 215-231.

Discussion shows that both models are complementary, in describing behavior of electrons in crystals, in the sense of Heisenberg's uncertainty principle. Explanation of law of color-center absorption in alkali-halide crystals is based on these considerations. 48 ref.

2138* Disorder Model of an Intrinsic Distorted-Center Semiconductor Using Chromium Oxide as Example. (In German.) Karl Hauffle and Jochen Block. *Zeitschrift für physikalische Chemie*, v. 198, nos. 5-6, Oct. 1951, p. 232-247.

Experimental study of Cr_2O_3 (with and without admixture of other oxides) was made. Charts and tables summarize results. 19 ref.

2139* Disorder Phenomena and Conduction Processes in Intrinsic Semiconductors. (In German.) Karl Hauffle and Horst Grunewald. *Zeitschrift für physikalische Chemie*, v. 198, nos. 5-6, Oct. 1951, p. 248-257.

Effects of higher and lower-valent foreign oxides in the electrical conductivity of CuO were investigated. Results show that monovalent as well as polyvalent foreign oxides increase electrical conductivity. Study of Fe_3O_4 reveals that it is also an intrinsic semiconductor. Data are charted. 23 ref.

2140* Light Absorption and Photoelectric Conduction in ZnO. (In German.) E. Mollwo. *Zeitschrift für physikalsiche Chemie*, v. 198, nos. 5-6, Oct. 1951, p. 258-262.

Shows that photoelectric conductivity of ZnO lies in the range of self-absorption, and that the source of electrons released by the light rays is not the base lattice, but excess Zn^+ ions. The quantum yield and an effective volume for the reaction between light and Zn^+ impurity centers were determined. Includes graphs.

Miscellaneous Publications

2141 On Motion of Fluid on Boundary Layer Near Line of Intersection of Two Planes. L. G. Loitsianskii and V. P. Bolshakov. National Advisory Committee for Aeronautics, Technical Memorandum 1308, Nov. 1951, 27 pages. (Translated from Rep. No. 279, CAHI, 1936, p. 3-18.) (TL570 Un3tm)

Discusses and solves the problem of the interaction of the boundary layers near the intersection of a dihedral angle of any magnitude from 0 to 180°.

2142 Resistance of a Plate in Parallel Flow at Low Reynolds Numbers. Zbynek Janour. National Advisory Committee for Aeronautics, Technical Memorandum 1316, Nov. 1951, 40 pages. (Translated from *Letecky Vyzkummy Ustav*, Rep. 2, 1947.) (TL570 Un3tm)

Reports an investigation to show that at Reynolds Number lower than $2x10^4$, the resistance of a plate is not governed by the Blasius formula.

2143 Investigations on Wings With and Without Sweepback at High Subsonic Speeds. Jakob Ackeret, Max Degen, and Nikolaus Rott. National Advisory Committee for Aeronautics, Technical Memorandum 1320, Nov. 1951, 14 pages. (Translated from *Zeitschrift für angewandte Mathematik und Physik*, v. 1, 1950, p. 32-42.) (TL570 Un3tm)

Gives results of wind-tunnel tests on the above including calculation methods of tunnel correction, and discussion of measuring results.

2144 Concerning the Flow About Ring-Shaped Cowlings. Part VI. Further Measurements on Inlet Devices. Dietrich Küchemann and Johanna Weber. National Advisory Committee for Aeronautics, Technical Memorandum 1327, Dec. 1951, 21 pages. (Translated from ZWB Forschungsbericht No. 1236/6, Mar. 30, 1942.) (TL570 Un3tm)

Deals with further wind-tunnel measurements on inlet devices as supplement to previous articles concerning flow about ring-shaped cowlings. Results of a new test series are presented. A simple method of design is described and examined. Graphs.

2145 Criterions for Condensation-Free Flow in Supersonic Tunnels. Warren C. Burgess, Jr. and Ferris L. Seashore. National Advisory Committee for Aeronautics, Technical Note 2518, Dec. 1951, 39 pages. (TL570 Un3t)

Results of an investigation of the above are presented. Criterions for condensation-free flow are established by correlating experimental observations with the Volmer theory of nuclei formation. Experimental observations were made at Mach numbers up to 2.01. Preliminary evidence of effect of tunnel size is presented. Illustrations and graphs. 10 ref.

2146 A Velocity-Correction Formula for the Calculation of Transonic Mach Number Distributions Over Diamond-Shaped Airfoils. H. Reese Ivey and Keith C. Harder. National Advisory Committee for Aeronautics, Technical Note 2527, Nov. 1951, 28 pages. (TL570 Un3t)

Presents results of the above investigation. Data are discussed and graphed.

2147 Heat Capacity Lag in Gases. Richard Walker. National Advisory Committee for Aeronautics, Technical Note 2537, Nov. 1951, 40 pages. (TL570 Un3t)

Reviews the literature on sonic studies of the problem of excitation of molecular vibrations by collision. The theory on which the interpretation of the sonic work has been based is discussed. Principal experimental programs are described and a table of the available results is included.

2148 Application of Variational Methods to Transonic Flows With Shock Waves. Chi-Teh Wang and Pei-Chi Chou. National Advisory Committee for Aeronautics, Technical Note 2539, Nov. 1951, 32 pages. (TL570 Un3t)

Suggests a procedure for computing numerical solutions for regions of flow behind shock waves. Mathematical treatment. Tabulated data.

2149 Studies of von Kármán's Similarity Theory and Its Extension to Compressible Flows. A Critical Examination of Similarity Theory for Incompressible Flows. C. C. Lin and S. F. Shen. National Advisory Committee for Aeronautics, Technical Note 2541, Nov. 1951, 24 pages. (TL570 Un3t)

A discussion and theoretical analysis of the above.

2150 Studies of von Kármán's Similarity Theory and Its Extension to Compressible Flows; A Similarity Theory for

Turbulent Boundary Layer Over a Flat Plate in Compressible Flow. C. C. Lin and S. F. Shen. National Advisory Committee for Aeronautics, Technical Note 2542, Nov. 1951, 38 pages. (TL570 Un3t)

Discussion and mathematical treatment of the above. 23 ref.

2151 Studies of von Kármán's Similarity Theory and Its Extension to Compressible Flows. Investigation of Turbulent Boundary Layer Over a Flat Plate in Compressible Flow by the Similarity Theory. S. F. Shen. National Advisory Committee for Aeronautics, Technical Note 2543, Nov. 1951, 43 pages. (TL570 Un3t)

A mathematical treatment. 12 ref.

2152 Hydrodynamic Lubrication of Cyclically Loaded Bearings. R. W. Dayton and E. M. Simons. National Advisory Committee for Aeronautics, Technical Note 2544, Nov. 1951, 76 pages. (TL570 Un3t)

Presents results of the above investigation conducted to check the validity of analytical studies of simple cases of cyclic loading, and to determine the effect of the loading conditions on hydrodynamic lubrication when the load diagram is so complex that analytical treatment of the problem is difficult.

2153 An Investigation by the Hodograph Method of Flow Through a Symmetrical Nozzle With Locally Supersonic Regions. F. Edward Ehlers and Hirsh G. Cohen. National Advisory Committee for Aeronautics, Technical Note 2547, Nov. 1951, 61 pages. (TL570 Un3t)

Theoretical analysis and mathematical treatment of the above. Flow charts and diagrams. 19 ref.

2154 Determination of Shapes of Boattail Bodies of Revolution of Minimum Wave Drag. Mac C. Adams. National Advisory Committee for Aeronautics, Technical Note 2550, Nov. 1951, 20 pages. (TL570 Un3t)

By use of an approximate equation for the wave drag of slender bodies of revolution in a supersonic flow field, the optimum shapes of certain boattail bodies are determined for minimum wave drag. The properties of 3 specific families of bodies are determined. The method presented is easily generalized to determine minimum-wave-drag profile shapes which have contours that must pass through any prescribed number of points. Graphs.

2155 Effect of Various Parameters Including Mach Numbers on the Single-Degree-of-Freedom Flutter of a Control Surface in Potential Flow. Harry L. Runyan. National Advisory Committee for Aeronautics, Technical Note 2551, Dec. 1951, 33 pages. (TL570 Un3t)

Demonstrates by theoretical calculations that single-degree-of-freedom control-surface flutter is possible. The effects of structural damping, aerodynamic balance, axis of rotation, and compressibility are included. Data are graphed. 12 ref.

2156 Considerations on the Effect of Wind-Tunnel Walls on Oscillating Air Forces for Two-Dimensional Subsonic Compressible Flow. Harry L. Runyan and Charles E. Watkins. National Advisory Committee for Aeronautics, Technical Note 2552, Dec. 1951, 18 pages. (TL570 Un3t)

In the above an important result shown is that, for certain conditions of wing frequency, tunnel height, and Mach number, the tunnel and wing may form a resonant system so that the forces on the wing are greatly changed from the condition of no tunnel walls. It is pointed out that similar conditions exist for 3-dimensional flow in circular and rectangular tunnels and apparently, within certain Mach number ranges, in tunnels of nonuniform cross section or even in open tunnels or jets.

2157 Theoretical and Experimental Investigation of Condensation of Air in Hypersonic Wind Tunnels. H. Guyford Stever and Kenneth C. Rathbun. National Advisory Committee for Aeronautics, Technical Note 2559, Nov. 1951, 79 pages. (TL570 Un3t)

In the above investigation, the theory of kinetics of condensation is analyzed and some of its weaknesses are discussed. In particular, the theory is modified to take into account the dependence of surface tension on the radius of curvature of the drops onto which condensation is taking place. This modified condensation theory is applied to pure oxygen and nitrogen and its predictions are compared with those of the unmodified theory of condensation. Illustrations, graphs, and tables. 33 ref.

2158 An Experimental Investigation of Transonic Flow Past Two-Dimensional Wedge and Circular-Arc Sections Using a Mach-Zehnder Interferometer. Arthur Earl Bryson, Jr. National Advisory Committee for Aeronautics, Technical Note 2560, Nov. 1951, 97 pages. (TL570 Un3t)

Pressure distributions and drag coefficients for the wedge and circular-arc sections are presented throughout the entire transonic range of velocities. Diagrams, graphs, and "interferograms." 34 ref.

2159 Numerical Determination of Indicial Lift of a Two-Dimensional Sinking Airfoil at Subsonic Mach Numbers From Oscillatory Lift Coefficients With Calculations for Mach Number 0.7. Bernard Mazelsky. National Advisory Committee for Aeronautics, Technical Note 2562, Dec. 1951, 38 pages. (TL570 Un3t)

The above is concerned with the use of reciprocal relations for determining, for compressible flow, the indicial lift functions directly from the lift data that are available for the airfoil oscillating harmonically. Data are graphed and tabulated. 11 ref.

2160 Effect of Slip on Flow Near a Stagnation Point and in a Boundary Layer. T. C. Lin and S. A. Schaaf. National Advisory Committee for Aeronautics, Technical Note 2568, Dec. 1951, 28 pages. (TL570 Un3t)

Theoretical analyses are presented on the above. The results indicate that the stagnation pressure is increased because of the effect of slip, but that there is a negligible effect on the flat-plate skin-friction coefficient in the range of application of the analysis. Data are graphed. 19 ref.

2161 Application of the von Kármán Momentum Theorem to Turbulent Boundary Layers. Jerold M. Bidwell. National Advisory Committee for Aeronautics, Technical Note 2571, Dec. 1951, 25 pages. (TL570 Un3t)

Presents results of a study of the above. 17 ref.

2162 Approximate Methods for Calculating the Flow About Nonlifting Bodies of Revolution at High Supersonic Airspeeds. A. J. Eggers, Jr., and Raymond C. Savin. National Advisory Committee for Aeronautics, Technical Note 2579, Dec. 1951, 40 pages. (TL570 Un3t)

Flow at high supersonic speeds about a body of revolution was investigated analytically. 10 ref.

2163 An Analysis of Flow in Rotating Passage of Large Radial-Inlet Centrifugal Compressor at Tip Speed of 700 Feet Per Second. Vasily D. Prian and Donald J. Michel. National Advisory Committee for Aeronautics, Technical Note 2584, Dec. 1951, 46 pages. (TL570 Un3t)

Presents results of an investigation on the above in order to provide more knowledge on flow conditions within the impeller. Data are tabulated and graphed.

2164 Transonic Flow Past a Wedge Profile With Detached Bow Wave—Details of Analysis. Walter G. Vincenti and Cleo B. Wagoner. National Advisory Committee for Aeronautics, Technical Note 2588, Dec. 1951, 48 pages. (TL570 Un3t)

Presents results of a theoretical study on the above. The specific problem under consideration is that of a thin, finite wedge at zero angle of attack, with particular application to the case of the double symmetrical, double-wedge profile. Graphs and tables. 32 ref.

2165 Effect of Imperfect Mixing in Streams. William Karush. U. S. Atomic Energy Commission, AECD-3245, Apr. 6, 1945, 12 pages. (UF767 U3a)

Using the eddy diffusion coefficient, an equation is set up for the temperature field in a turbulent stream. The equation is solved for several special cases of interest.

2166 Nuclear Science in Engineering Education; A Selected List of References for Instructors. U.S. Atomic Energy Commission, TID-3011, Aug. 22, 1951, 17 pages. (UF767 Un3ti)

The above includes topics such as heat transfer, chemistry, radiation detection and protection, radioactive wastes, and chemical processing. Brief abstracts are included.

32. *Physics*

Books

2167 Gas Discharge Lamps; Principles, Characteristics, Applications. J. Funke and P. J. Oranje. 270 pages. 1951. N. V. Philips' Gloeilampenfabrieken, Eindhoven, Netherlands. (TK4351 F96gtr)

Presents a survey of existing types of discharge lamps sold by N. V. Philips' Gloeilampenfabrieken, Eindhoven, Netherlands, together with their relative possibilities, advantages and disadvantages, characteristics, and principles. Illustrations.

2168 Theory of Vibrations. N. W. McLachlan. 154 pages. 1951. Dover Publications, New York. (QC235 M22t)

Presents a concise, analytical treatment of the above.

2169 An Introduction to Acoustics. Robert H. Randall. 340 pages. 1951. Addison-Wesley Press, Inc., Cambridge, Mass. (QC225 R15i)

Presents a comprehensive survey on the above. Includes chapter problems. 59 ref.

2170 Oscillations of the Earth's Atmosphere. M. V. Wilkes. 74 pages. 1949. Cambridge University Press, New York. (QC883 W650)

Describes the occurrence of lunar and solar air-tides, and the theory of oscillations in a rotating atmosphere. Numerical evaluation of the phenomena is given.

See also:
1528 (radiation-measuring instruments)
1529 (radiation-measuring instruments)
1539 (light transmission through suspension)
1564 (photoconductive cells for infrared radiation)
1581 (handbook of colorimetry)
1696 (supersonic propellors)
1745 (boron carbide bricks for neutron absorption)
1993 (electrical properties of insulating materials)
2013 (ultrasonics in plastic industry)

33. ELECTRICITY AND ELECTRONICS

2171 Transformer Analogs of Diaphragms. B. B. Bauer. *Journal of the Acoustical Society of America*, v. 23, Nov. 1951, p. 680-683.

The use of the conventional analog for diaphragms in equivalent circuits often causes serious difficulties. The action of a diaphragm is shown to be analogous to that of a system of ideal transformers, each corresponding to an area of the diaphragms. Simultaneous use of the transformer analogy of diaphragms and the transformer analogy of transducer couplings is treated in the appendix.

2172 The Output Current of a Nonlinear Device. Bernard Salzberg. *American Journal of Physics*, v. 19, Dec. 1951, p. 555-561.

Explicit expressions and graphs are derived for the coefficients of the Fourier terms when n=1, 3/2, and 2, for the case of continuous output current, as well as for the case of dicontinuous output current.

2173* Magnetic Amplifiers; A Rising Star in Naval Electronics. A. M. Vincent. *Journal of the American Society of Naval Engineers*, v. 63, Nov. 1951, p. 903-954.

Discusses advantages and uses of the above. Covers history and fundamentals. Compares tube and magnetic amplifiers, and electronic applications. Diagrams and illustrations. Extensive bibliography arranged by year of publication.

2174* High-Frequency Phase Meter With Direct Recording. III. Graph Scriber. (In German.) Alfred Ruhrmann. *Archiv für technisches Messen*, Nov. 1951, p. T121-T122 (4 p.).

Schematic diagrams illustrate described phase recorder, which is used to control stability of feed-back amplifiers and to prevent phase distortions in certain instruments.

2175* The Cold Cathode Glow Discharge Tube. D. S. Peck. *Bell Laboratories Record*, v. 29, Dec. 1951, p. 550-553.

Describes the above, and discusses requirements and applications.

2176 Noise Suppression in Triode Amplifiers. II. A. van der Ziel. *Canadian Journal of Technology*, v. 29, Dec. 1951, p. 540-553.

A mathematical treatment.

2177* The Transport of Discontinuities in an Electromagnetic Field. E. T. Copson. *Communications on Pure and Applied Mathematics*, v. 4, Nov. 1951, p. 427-433.

A mathematical treatment.

2178* Technique of Trustworthy Valves. Ernest G. Rowe. *Electrical Communication*, v. 28, Dec. 1951, p. 257-275.

Presents evidence showing that early life failures in electronic tubes are due almost entirely to mechanical and glass troubles. Numerous illustrations and diagrams.

2179* Behavior of Gas Discharge Plasma in High-Frequency Electromagnetic Fields. Ladislas Goldstein and N. L. Cohen. *Electrical Communication*, v. 28, Dec. 1951, p. 305-321.

Presents results of an experimental study of some of the properties of gas-discharge plasma. Specifically those properties were studied that are related to the complex conductivity of the gas-discharge plasma, when placed in a high-frequency electromagnetic field. Two types of plasma were investigated; the discharge plasma maintained by a d.c. field, and the disintegrating plasma obtained after excitation by a pulse of short duration. 10 ref.

2180* Magneto-Optics of an Electron Gas for Guided Microwaves: Propagation in Rectangular Waveguide. Ladislas Goldstein, M. A. Lampert, and J. F. Heney. *Electrical Communication*, v. 28, Dec. 1951, p. 322.

Describes the results of propagation experiments with a magneto-electronic medium in a rectangular waveguide. Both the results and their interpretation are quite different from those briefly mentioned previously.

2181 The Mechanism of Electrolytic Rectification. H. E. Haring. *Journal of the Electrochemical Society*, v. 99, Jan. 1952, p. 30-37.

Presents an electrochemical theory for rectification as exemplified by the Ta (or Al) electrolytic rectifier and capacitor, and suggests that this same theory may be applicable to other forms of contact rectification. An explanation for the breakdown of electrolytic rectifiers and capacitors when subjected to excessively high voltages is proposed. 15 ref.

2182 Magnetic Centering of Electrostatic C-R Tubes. S. L. Reiches and D. P. Ingle. *Electronics*, v. 25, Jan. 1952, p. 101-103.

Tells how pictures on the new electrostatically-focused tubes can be centered by one of three different permanent magnet devices—the rotatable magnet, the contra-rotatable magnet, or the offset ring. Design and adjustment procedures of the 3 basic types are shown.

2183 Tunable Miniature Magnetron. D. A. Wilbur, P. H. Peters, and H. W. A. Chalberg. *Electronics*, v. 25, Jan. 1952, p. 104-109.

Describes the above designed primarily for use as a local oscillator. Its extreme frequency range, 0-1000 mc., and relatively large output make it applicable in such apparatus as signal generators, transmitters and wherever a low power, compact, and stable source of r.f. energy is required.

2184 Nuclear-Resonance Magnetic Field Control. H. A. Thomas. *Electronics*, v. 25, Jan. 1952, p. 114-118.

Nuclear-resonance technique makes it possible to regulate a 35-ton magnet with 4 type-807 tubes to accuracies approaching 0.0025%. Servo-system control loop is actuated by negative-resistance resonance detector coupled to a proton sample vial of water or mineral oil. Measurements of absolute field are obtained with oscilloscope and frequency meter. 10 ref.

2185 Short-Pulse Amplifiers. George F. Myers. *Electronics*, v. 25, Jan. 1952, p. 128-131.

Describes 12-tube distributed-line amplifier which uses 3 cascaded banks of 4 4X150A power tetrodes. Novel circuit layout using standard parts has band width from 1 to 100 mc. and produces voltage gain of 40 db. for oscilloscope presentation of 1-volt pulses. Limitations are discussed.

2186 Magnetic Amplifier Voltage Regulator. *Electronics*, v. 25, Jan. 1952, p. 140, 142.

Describes a tubeless device capable of regulating at 160-400 volts within 0.5% for load currents from 0 to 500 ma., and within 0.5% for ± 10% change in line voltage and load currents of 0-300 ma. Diagrams.

2187 Special Tubes for Broad-Band Amplifiers. *Electronics*, v. 25, Jan. 1952, p. 142, 204, 208. (Based on paper by G. T. Ford and E. J. Walsh.)

Describes the above developed for the Bell System. These tubes have higher ratios of trans-conductance to capacitance, brought about mainly by a new grid employing many turns of very fine wire.

2188 Radioactive Current Source. *Electronics*, v. 25, Jan. 1952, p. 212, 214.

Radioactivity can be used as a source of electric energy (at low levels) through the use of an "atomic battery" recently developed by the Ohmart Company of Cincinnati, Ohio. The conversion of radioactive energy to electrical energy is obtained by a cell made of two dissimilar materials separated by a filling gas. Uses in corrosion measurement, analysis of alloys, gas analysis and measurement of vacuum, pressure, and temperature are indicated.

2189 Steady-State Behavior of Carbon-Pile Regulators. D. G. Scorgie and D. H. Schaefer. *Electrical Engineering*, v. 71, Jan. 1952, p. 46. (A condensation; to be published in *AIEE Transactions*, v. 70, 1951.)

Measurements were made using an electronic circuit with feedback for controlling carbon-pile resistance directly. With its use, steady-state carbon-pile resistance vs. operating-coil voltage hysteresis loops of an aircraft regulator were measured. A set of curves was obtained showing effect of hysteresis heating of the carbon pile itself; and ambient temperatures when the carbon pile is not itself a heat source.

2190 The Use of Selenium Rectifiers in Self-Saturating Magnetic Amplifiers. J. R. Conrath. *Electrical Engineering*, v. 71, Jan. 1952, p. 51-54.

Effects of forward voltage drop, leakage, and capacitance are discussed, as is selection of a rectifier stack for an amplifier.

2191 High-Voltage A-C Motor Controller. G. W. Heumann. *Electrical Engineering*, v. 71, Jan. 1952, p. 54-57.

Some trends in the present-day design and use of the above on systems with line voltages of 601-5000 volts are discussed, and some of the essential differences between controllers using air-break contacts and oil-immersed contacts are pointed out.

2192* Arc Form and Movement in an Experimental Axial Air-Blast Circuit-Breaker. F. O. Mason. *Engineering*, v. 172, Dec. 7, 1951, p. 710-713; Dec. 14, 1951, p. 743-745.

Presents results of an investigation on the above. Apparatus used in the study is described in detail. Illustrated.

2193 Impedance Network for Testing Large Induction Apparatus. S. C. Leonard. *General Electric Review*, v. 54, Dec. 1951, p. 27-32.

Describes and discusses method for accurately measuring low-power-factor impedance loss of power transformers, induction regulators, and reactors. Diagrams and illustrations.

2194* Instruments for Use in the Microwave Band. A. F. Harvey. *Proceedings of the Institution of Electrical Engineers*, v. 98, pt. 2, Dec. 1951, p. 781-789; disc., p. 789-792.

Describes the above for the measurement of power, frequency, and impedance. Emphasis is on more recent instruments and on those for the mm.-wavelength region. Methods of manufacture and their influence on behavior and design are also discussed. 35 ref.

2195 A Single-Ended Push-Pull Audio Amplifier. Arnold Peterson and Donald B. Sinclair. *Proceedings of the I.R.E.*, v. 40, Jan. 1952, p. 7-11.

An amplifier circuit for push-pull operation of two output-tubes that provides a direct output to a grounded load is described. Methods for using this circuit with triode and beam-power output tubes are given, and the ultimate possibility of eliminating the output transformer for driving a loudspeaker is discussed.

2196 Reduction of Interference in FM Receiver by Feedback Across the Limiter. R. M. Wilmotte. *Proceedings of the I.R.E.*, v. 40, Jan. 1952, p. 34-36.

Describes the theory of a feedback circuit around a limiter of an FM receiver, which has the effect of reducing the interference caused by an undesired signal of nearly equal intensity to the desired signal.

2197 Quartz-Crystal Measurement at 10 to 180 Megacycles. E. A. Gerber. *Proceedings of the I.R.E.*, v. 40, Jan. 1952, p. 36-40.

A method is described for measuring the equivalent parameters of both the main and spurious modes of very high-frequency crystal units. The crystal is placed between the plate and cathode of an amplifier tube, and the voltage developed across it is recorded as a function of frequency.

2198 An Experimental High-Transconductance Tube Using Space-Charge Deflection of the Electron Beam. J. T. Wallmark. *Proceedings of the I.R.E.*, v. 40, Jan. 1952, p. 41-48.

A new principle for the control of current in electron tubes was presented. An analysis of the principle and the results from experimental tubes demonstrate that a high transconductance can be obtained at low current. This should be very useful in broad-band-amplification applications.

2199 High-Frequency Characteristics of Resistance-Coupled Triode Amplifiers. James W. Sauber. *Proceedings of the I.R.E.*, v. 40, Jan. 1952, p. 48-49.

Describes a semi-graphical method of calculating the steady-state, high-frequency response of cascaded resistance-coupled triode amplifiers. Full allowance is made for the effects of inter-electrode capacitances.

2200 Traveling-Wave Tube Noise Figure. D. A. Watkins. *Proceedings of the I.R.E.*, v. 40, Jan. 1952, p. 65-70.

Pierce's estimate of the noise figure, when extended to include the effects of space-charge and loss, has been found to be reasonably accurate in predicting noise figures of experimental tubes. The schemes for reducing stream noise content have proved successful in the practical tubes and suggest a general approach to the problem of noise reduction in beam-type amplifiers. 10 ref.

2201* Electronic Timers. T. W. Maciejowski. *Microtecnic* (English Ed), v. 5, Sept.-Oct. 1951, p. 208-224.

Presents the principles of operation and reviews a number of practical applications of the above. Graphs and diagrams.

2202 Harmonic Output of the Synchronous Rectifier. Paul Selgin. *Journal of Research of the National Bureau of Standards*, v. 47, Nov. 1951, p. 427-432.

A mathematical analysis.

2203* A New High-Pressure Mercury Lamp With Fluorescent Bulb. J. L. Ouweltjes, W. Elenbaas, and K. R. Labberté. *Philips Technical Review*, v. 13, Nov. 1951, p. 109-118.

Shows construction of the above in its present form. The discharge takes place in a small tube of fused silica containing a certain amount of mercury together with a rare gas under a pressure of a few cm. Hg. This rare gas and provision of an auxiliary electrode enables the lamp to be started with normal line voltages.

2204* Deformation of Electrolytic Rectifier's and Some Blocking-Layer Rectifiers. (In French). W. Ch. van Geel and B. C. Bouma. *Philips Research Reports*, v. 6, Dec. 1951, p. 401-424.

Shows that electrolytic rectifiers and some other kinds of rectifiers can lose their rectifying properties by sending a current through the system in the direction opposite to the current used during the formation of the oxide layer (blocking-layer). After this process, the system can be restored by sending a current through the system in the direction that was originally the blocking direction. After reforming, the system recovers its rectifying properties. For re-forming, alternating voltage can also be used. Describes application to synthetic rectifiers and rectifiers with barrier layers. An explanation of the observed behavior is suggested. Characteristic curves of various types are presented.

33. *Electricity and Electronics*

2205* Transfer and Transport of Energy by Resonance Processes in Luminescent Solids. P. J. Botden. *Philips Research Reports*, v. 6, Dec. 1951, p. 425-426.

Above were investigated in solid systems in which excitation does not produce free electrons and holes, so that these processes are brought about by resonance. A distinction is made between those systems in which transport of energy may occur via the base lattice and so-called sensitized systems in which transport may occur only via particular centers of the lattice. Part I deals with the investigations on alkaline-earth tungstates and molybdates activated with samarium. In Part II, a number of sensitized systems are dealt with. It has been believed that the ratio of the quantum efficiencies of activator fluorescence and of sensitizer fluorescence will not increase with increasing sensitizer concentrations at constant activator concentrations. This is found to be in contradiction with the author's results.

2206 Space Current Changes in Thermionic Valves Following Small Pulses of Current. J. R. Tillman. *Proceedings of the Physical Society*, v. 64, ser. B. Dec. 1, 1951, p. 1046-1052.

Presents results of experimental investigation on the above.

2207 Electron Current Control in Arc Discharge Studies. Raymond L. Murray. *Review of Scientific Instruments*, v. 22, Nov. 1951, p. 843.

Describes 3 methods used in the above. Approximate relations between the 3 methods are given.

2208 Direct Coupled Control Circuit Not Requiring Cascaded Power Supplies or Special Biasing Voltages. John Degelman. *Review of Scientific Instruments*, v. 22, Nov. 1951, p. 847.

Shows how a simple neon bulb is used to connect the plate circuit of a controlling multivibrator directly to the grid circuit of a controlled power tube, obviating the use of cascaded power supplies and special biasing voltages. Circuit diagram.

2209 A Method for Modulation in Photoelectric Recording. Erik Odeblad. *Review of Scientific Instruments*, v. 22, Nov. 1951, p. 847-848.

Tells how, with the aid of a pentode, to convert light energy in photoelectric recording to a sinusoidally modulated potential. Within a certain range the response is nearly linear. Data are graphed. Diagram.

2210 Cold-Cathode Tubes and Their Application to Airborne Electronic Equipment. Maynard A. Babb. *Tele-Tech*, v. 11, Jan. 1952, p. 40-42.

Absence of heater-power and warm-up requirements and reduction in heat dissipation permit rugged designs more adaptable to miniaturization. Ability to install tubes in remote locations reduces auxiliary equipment requirements and simplifies internal wiring of aircraft. Diagrams and tables.

2211 Electrolytic Capacitors at Low Temperatures. C. D. Crater. *Tele-Tech*, v. 11, Jan. 1952, p. 44-45, 72.

Results of tests on 4 manufacturers' products indicate severe operational degradation at low temperatures; plain foil types permit superior stability; extended operation at −55°C. does not produce significant permanent changes in operating characteristics. Data are charted.

2212 Design for a Current-Regulated Power Supply. R. O. Maze. *Tele-Tech*, v. 11, Jan. 1952, p. 46-47.

Contrary to the usual voltage-regulated supply, the equipment described and diagrammed provides a high dynamic output impedance. Ripple suppression is measured as remaining ripple current in output.

2213 Simplified Approach to Toroidal Inductor Design. H. E. Harris. *Tele-Tech*, v. 11, Jan. 1952, p. 54-56, 107, 109, 111, 113.

Shows that toroidal coils offer many advantages over more conventional forms; and that, by using molybdenum permalloy for cores, precise control can be obtained. (To be continued.)

2214* On Design Theory of Pulse-Amplifier. (In English.) Kenzo Nagai and Tatsuo Ikeda. *Science Reports of the Research Institutes, Tohoku University*, ser. B, v. 1-2, Jan. 1951, p. 51-72.

Mathematical development. Circuit diagrams and graphs.

2215* The Effects of Grid Mesh on the Performance Characteristics of Klystrons. (In English.) Shintaro Uda and Junichiro Ireuchi. *Science Reports of the Research Institutes, Tohoku University*, ser. B, 1-2, Jan. 1951, p. 105-116.

Mathematical analysis. Circuit diagrams and graphs.

2216* The Theory of Noise in Transistor. (In English.) Yasushi Watanabe and Namio Honda. *Science Reports of the Research Institutes, Tohoku University*, ser. B, v. 1-2, Mar. 1951, p. 313-325.

The noise source in the collector of the transistor is theoretically considered. It is shown that the noise production is due to the fluctuation of the number of holes in the bulk of the Ge along the path from the emitter to the collector. The order of magnitude of noise temperature agrees well with the experiments, and its frequency dependance can be explained qualitatively.

2217* Electron Oscillation of the Reflex Klystron. (In English.) Mitsuo Ishida and Yasuyuki Ibaraki. *Science Reports of the Research Institutes, Tohoku University*, ser. B, v. 1-2, Mar. 1951, p. 327-336.

Discusses the above and presents results of experiments. Circuit diagrams and graphs.

2218* Electron Transit Time Affected by the Initial Velocity of Emitted Electrons From the Cathode and the Field Irregularity Around the Grid Wires in a Triode. (In English.) Yujiro Koike and Sonosuke Yamanaka. *Science Reports of the Research Institutes, Tohoku University*, ser. B, v. 1-2, Mar. 1951, p. 349-364.

In the recent very-high-frequency experiments, it was noticed that limiting frequency of a triode oscillator is much higher than the value expected from the existing theory. Two important factors are pointed out to interpret this difference. These two factors are analyzed theoretically.

2219* The Amplification Factor of a Triode. A Parallel Plane Triode With Arbitary Electrode Dimension. (In English.) Masaobu Wada. *Science Reports of the Research Institutes, Tohoku University*, ser. B, v. 1-2, Mar. 1951, p. 399-420.

A theoretical, mathematical development for use in design of above.

2220* Directional-Coupler Errors; Effect of Coupling-Probe Reflections. F. A. Benson. *Wireless Engineer*, v. 28, Dec. 1951, p. 371-372.

Shows that the well-known type of directional coupler in which two coupling probes are placed a quarter-wave-length apart in a transmission line has an inherent error caused by reflections from the probes. The error varies with the relative phase of the transmitted and reflected waves and also with the phases of the reflections at the probes.

2221* Electric Arcs With and Without Area of Impact on the Cathode. (In German.) W. Thouret, W. Weizel, and P. Günther. *Zeitschrift für Physik*, v. 130, Nov. 13, 1951, p. 621-631.

Discusses d.c. arcs in mercury and xenon, the structure of impact area on the cathode, a.c. arcs, reignition tips in a.c. arcs, and cathode temperatures. Diagrams, photographs, and graphs. 11 ref.

2222* Effect of Electron Diffusion on the Deceleration Radiation of Thin Anticathodes. (In German.) O. Blunck. *Zeitschrift für Physik*, v. 130, Nov. 13, 1951, p. 632-640.

Shows that the dispersion of electrons in the anticathode can not explain the difference between measured acceleration radiation *(bremsstrahlung)* and Sommerfeld's theory. Includes diagrams and graphs. 27 ref.

2223* Present Status of the Theory of Dry-Cell Rectifiers. P. T. Landsberg. *Zeitschrift für physikalische Chemie*, v. 198, nos. 1-4, Oct. 1951, p. 75-88.

Review of literature critically examines existing theories, discusses recent research on characteristic curves of direct current, and points out the importance of boundary layers with inhomogeneous impurity distribution and of a generalization of Schottky's capacity rule. Data are charted. 39 ref.

2224* Alternating Current Polarization of Electrodes With a Potential-Determining Process Included in the Equi-

librium Potential. I. (In German.) Heinz Gerischer. *Zeitschrift für physikalsiche Chemie*, v. 198, nos. 5-6, Oct. 1951, p. 286-313.

The relation between a.c. pseudo resistance of an electrode and kinetic magnitudes of the total potential-determining process for different possible sequences of reaction were investigated. 12 ref.

2225* Measuring the Conductivity of Plasma in High-Efficiency Electric Arcs. (In German.) H. Maecker and T. Peters. *Zeitschrift für physikalsiche Chemie*, v. 198, nos. 5-6, Oct. 1951, p. 318-328.

Reports results of experimental studies on above. Computed and measured plasma conductivities are compared and evaluated. Includes diagrams, graphs, and tables.

Miscellaneous Publications

2226 Static Frequency Transformers for Small Electric Motors. F. Dahlgren and A. K. Littke-Persson. *Acta Polytechnica* (Electrical Engineering Series), v. 3, no. 6, 1951, 26 pages. (T1 A81)

An experimental study, including certain theoretical considerations, of the possibilities of operating single-phase asynchronous motors by means of static frequency transformers. Deals with frequency-doubler circuits using combinations of transductors and dry-cell valves, with frequency tripler circuits using 3-phase transformers, with saturated core and secondary winding induced by the zero-sequence flux component.

2227 On the Theory of Electron Wave Tubes. Olof E. H. Rydbeck and Sven K. H. Forsgren. *Acta Polytechnica* (Electrical Engineering Series), v. 3, no. 8, 1951, 29 pages. (T1 A81)

Electron waves of a single beam were studied under general conditions. The effect of a single beam in a neutral ionized gas, and the development of electron-beam waves on two well mixed beams were studied in detail. A preliminary study was made of the characteristic roots of a traveling-wave tube with two well-mixed beams, and the perturbation of the pure traveling wave and double-stream roots is discussed.

2228 Experimental Observation of Double-Stream Amplification. Bertil N. Agdur. *Acta Polytechnica* (Electrical Engineering Series), v. 3, no. 10, 1951, 8 pages. (T1 A81)

Describes construction and performance of a double-stream microwave amplifier built at Chalmers University of Technology. Also, noise measurements were carried out on a traveling-wave tube, operating at a frequency of about 10,000 Mc./s.

2229 Microwave Propagation in the Optical Range. Olof F. Peres, Bo K. E. Stjernberg, and Sven K. H. Forsgren. *Acta Polytechnica* (Electrical Engineering Series), v. 3, no. 11, 20 pages. (T1 A81)

Presents results of microwave propagation tests at 10, 3, and 1 cm wavelengths. Gives a description of the test paths and equipment; discusses the results, presented in the form of a general survey together with a thorough treatment of some interesting special cases.

2230 A 2,000,000-Kva Transformer Core. W. C. Sealey. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 8-11. (TK1 Am35tr)

Describes construction of a core that demonstrates the feasibility of constructing transformers many times as large as those now being built. The advantages of larger transformers are lower cost per kva. and less loss per kva. transformed, resulting in higher efficiency. Diagrams.

2231 Ice Testing and Its Influence Upon Switch Design. G. E. Herberlein and E. J. Field. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 37-42; disc., p. 42-44. (TK1 Am35tr)

Discusses the above. Based upon the observed results of almost 100 individual ice tests, design recommendations are given.

2232 Radial and Tangential Stresses in Impregnated Paper Insulation. J. B. Whitehead. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 56-59; disc., p. 59-63. (TK1 Am35tr)

An analytical method for computing the stress at any point in the impregnated paper insulation of high-voltage power cables is developed. The method is extended to the evaluation of both radial and tangential stresses, and to those arising in graded cables. Limitations in the use of high-density paper are explained.

2233 Transient Response of Saturable Reactors With Resistive Load. H. F. Storm. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 95-102. (TK1 Am35tr)

Determines major factors which control the above.

2234 The Application of a Series Capacitor to a Synchronous Condenser for Reducing Voltage Flicker. P. M. Black and L. F. Lischer. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 144-150. (TK1 Am35tr)

Describes the above, giving performance data. Diagrams, graphs, and illustrations.

2235 Capacitor Switching Phenomena. R. C. Van Sickle and J. Zaborszky. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 151-158; disc., 158-159. (TK1 Am35tr)

The capacitor switching performance of a circuit breaker was found to depend on the power supply system as well as on size of the capacitor bank switched. Experimental data showed that the voltage drop produced by the capacitor current flowing through the source inductance determines the time when the arc first extinguishes and the corresponding contact separation. Data are graphed.

2236 An Electromechanical Transducer. J. F. Engelberger and H. W. Kretsch. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 213-216. (TK1 Am35tr)

The above changes mechanical and certain electrical quantities into corresponding electric current, mainly for purposes of remote transmission. Data are graphed. 12 ref.

2237 Bibliography of Relay Literature, 1947-1949. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 247-250. (TK1 Am35tr)

2238 Networks for Which Magnitude or Phase Angle of Input Impedance or Transfer Admittance Remains Constant as Load Varies. Raymond S. Berkowitz. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 286-291. (TK1 Am35tr)

Considers several special cases of the above. Results are summarized in tables.

2239 The Generalized Transmission Matrix Stability Criterion. Pierre M. Honnell. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 292-296; disc., p. 296-298. (TK1 Am35tr)

Presents the above. A generalized criterion is given which is applicable to transmission loops incorporating bilateral amplifiers, where the transmission loop may be opened without consideration of the impedances to the left and right of the cut. It applies equally well to electromechanical networks or servomechanisms. 16 ref.

2240 Loci of Complex Impedance and Admittance Functions. Edward L. Michaels. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 299-303. (TK1 Am35tr)

Presents a systematic investigation of the loci of complex impedance and admittance functions of various combinations of 2-terminal, 3-element, linear dissipative networks at all frequencies. Diagrams and graphs.

2241 Calculation of Flux Distributions With Saturation. H. Poritsky. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 309-319; disc., p. 319. (TK1 Am35tr)

Several methods of determination of flux distribution in magnetic materials exhibiting saturation phenomena are reviewed.

2242 Transformer Magnetizing Inrush Current. T. R. Specht. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 323-327; disc., p. 327-328. (TK1 Am35tr)

Develops formulas and curves for calculating the above.

33. *Electricity and Electronics*

2243 Three-Phase Measurements of Resistance. L. W. Matsch, N. C. Basu, and G. R. Horcher. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 350-352; disc., p. 352-354. (TK1 Am35tr)

Describes a method of measuring the true a.c. resistance of the individual conductors of a 3-conductor system of 3-phase current. An analysis of the effect of unbalanced inductive reactances on the measured values of a.c. resistance is shown in the appendix.

2244 Progress Report of the AIEE Magnetic Amplifier Subcommittee. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 445-459.; disc., p. 449-450. (TK1 Am35tr)

The above covers fundamental developments, design, and application of magnetic amplifiers and of the materials and components as used; standardization of definitions, nomenclature, symbols, and operating characteristics; and encouragement of the exchange of information, as by technical papers, conference sessions, and demonstrations.

2245 Steady-State Analysis of Self-Saturating Magnetic Amplifiers Based on Linear Approximations of the Magnetization Curve. Walter H. Esselman. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 451-459. (TK1 Am35tr)

Introduces a method for predicting the output currents of self-saturating magnetic amplifiers. The initial work illustrates how the load currents may be computed by assuming a 3-straight-line representation of the hysteresis loop. A simplified procedure is developed and applied to two halfwave amplifiers. The factors influencing the output of the full-wave and doubler circuits are then discussed and illustrated.

2246 The Effects of Loads and Disturbances Upon Feedback Controllers. R. W. Jones. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 460-464. (TK1 Am35tr)

Develops the necessary concepts for determination of gain in a feedback controller. Diagrams and graphs.

2247 A Hook-On Power Factor Meter. A. J. Corson and A. L. Nylander. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 468-472. (TK1 Am35tr)

Describes the principles of operation of the above. Presents the solution to several development problems. Diagrams and graphs.

2248 A Method of Gating for Parallel Computers. A. G. Ratz and V. G. Smith. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 510-516. (TK1 Am35tr)

A method of gating between two flip-flop circuits is described. The circuit uses two diodes and is particularly suited to parallel computers. The theory of the gating action and the necessary design in formation are given.

2249 Technical Problems Associated With the Application of a Capacitor in Series With a Synchronous Condenser. R. L. Witzke and E. L. Michelson. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 519-525. (TK1 Am35tr)

Surveys the above. Diagrams and graphs.

2250 Fundamental Effects of Series Capacitors in High-Voltage Transmission Lines. A. A. Johnson, J. E. Barkle and D. J. Povejsil. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 526-535; disc., p. 535-536. (TK1 Am35tr)

Outlines and interprets the above in order that the merits and limitations of series compensation can be evaluated for any particular circuit or system. Curves are presented showing the effects of series compensation on power transfer, power factor, and efficiency for lines of varying length, voltage, and impedance.

2251 Network Synthesis by Graphical Methods for A-C Servomechanisms. George A. Bjornson. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 619-625. (TK1 Am35tr)

Expressions are given which describe the effect of a carrier-frequency network in terms of its transfer function. From these the standard procedure for synthesizing a carrier-frequency network, which approximately simulates the desired data-frequency network, is developed.

2252 A Note on the Design of Conditionally Stable Feedback Systems. Paul Travers. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 626-630. (TK1 Am35tr)

Presents, for a class of conditionally stable systems, equations which relate parameters of the loop transfer function to relative stability of the system transfer function and which indicate the condition for which the system bandwidth is a minimum when the magnitude of the loop function is required to have a specified value at a specific frequency. Graphs.

2253 A New High-Voltage Insulation for Turbine-Generator Stator Windings. C. M. Laffoon, C. F. Hill, Graham Lee Moses, and L. J. Berberich. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 721-726; disc., p. 726-730. (TK1 Am35tr)

Reports development of a new synthetic-resin-bonded mica-tape insulation for high-voltage stator windings. Reviews problems associated with earlier forms of high-voltage machine insulation. General construction and processing of the insulation are described briefly. Comprehensive test data are presented on characteristics of the materials employed and resultant physical and electrical properties. Illustrations and graphs. 10 ref.

2254 Alternating and Direct Voltage Endurance Studies on Mica Insulation for Electric Machinery. Graham Lee Moses. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 763-768; disc., p. 768-769. (TK1 Am35tr)

Reports research on voltage endurance of various mica insulations. Includes dielectric breakdown data with both a.c. and d.c. on numerous similar samples. Effects of repetitive testing, prolonged a.c. (60-cycle) stress, and mechanical damage to mica insulation are reported. Detection of insulation faults is described and conclusions are drawn. Graphs. 16 ref.

2255 Probabilities of Interference Between Resistance Welders. W. K. Boice. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 775-783. (TK1 Am35tr)

Presents calculated data concerning the probabilities that the voltage during a resistance weld will be inadequate because of voltage drops due to other welders. This information is useful for design of power systems for supplying groups of welders. Graphs. 10 ref.

2256 Welding Calculations—Effect of Conductor Configuration in Overhead Lines. H. Watson Tietze. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 784-786. (TK1 Am35tr)

Results of an investigation on the above show that proper evaluation of the magnitude of the voltage dip in single-phase welding problems requires recognition of the changes in reactance of conductors, disposed on a horizontal crossarm, due to interaction of the phase currents.

2257 A-C Arc Welders With Saturable Reactor Control. S. Oestreicher. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 787-790. (TK1 Am35tr)

Discusses characteristics of the above. Illustrations, graphs and diagrams.

2258 The Physical Mechanism of Low- and High-Current Arcs, and Their Relation to the Welding Arc. Wolfgang Kinkelnburg. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 800-803. (TK1 Am35tr)

Surveys the above.

2259 Shielded Dielectric-Rod Waveguides. Robert E. Beam and Hillard M. Wachowski. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 874-880. (TK1 Am35tr)

The boundary-value problem posed by a circular metallic waveguide of infinite length containing two coaxial dielectric regions

and propagating waves along its axis under steady-state conditions is solved. The conditions under which representative transverse electric, transverse magnetic, and hybrid modes will propagate are given. An approximate theory of attenuation of propagating modes for low-loss dielectrics and small losses in the metal is outlined. Graphs.

2260 Ignitrons for Frequency-Changer Welders. Richard R. Rottier. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 900-907. (TK1 Am35tr)

Gives a brief study of the frequency-changer welder circuit operation from a tube designer's standpoint. Analysis of the circuit has been presented previously, but the effect of the circuit requirements on tube design and performance are discussed.

2261 A Diode Bridge Limiter for Use With Electronic Analogue Computers. Russell J. Medkeff and Robert J. Parent. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 913-916. (TK1 Am35tr)

A new limiter circuit for use with electronic analogue computers was developed from the basic diode bridge circuit. This limiter is simple in construction, has only one adjustment and produces an absolute limit. Other useful circuit configurations using the basic diode bridge are given. Diagrams.

2262 Differential Analyzer Study of Harmonic Power Generation With Nonlinear Impedance Element. Paul E. Russell and H. A. Peterson. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 917-920. (TK1 Am35tr)

Presents results of an analysis of a nonlinear static element circuit which also may be useful as an efficient source of voltage supply of harmonic frequency of good wave form. The circuit is unique in that it uses neither rotating parts nor electronic devices. Diagrams. 20 ref.

2263 Results of a Questionnaire Covering Current Practices in Electrical Tests on Dielectrics in the Field. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 986-989. (TK1 Am35tr)

Data are tabulated.

2264 A New Method for Treating Electron Tubes When Used as Oscillators in the Free as Well as in the Synchronized States. Abd El-Samie Mostafa and M. El-Shishini Bey. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 999-1004. (TK1 Am35tr)

A mathematical treatment.

2265 Commutating Reactor Control for Mechanical Rectifiers. Edward J. Diebold. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 1062-1065. (TK1 Am35tr)

Discusses the characteristics of the above. In series with switching contacts, these reactors maintain the input current after closing and the residual current before opening at a very low value and permit free flow of current through a contact at any other time of the cycle in a mechanically operated switch.

2266 A Servo System for Heterodyne Oscillators. T. Slonczewski. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 1070-1072. (TK1 Am35tr)

Describes an oscillator driving mechanism which produces a constant time rate of progression of the oscillator frequency independently of the shape of its calibration curve. Diagrams.

2267 Tube Laboratory Manual. Research Laboratory of Electronics. *Massachusetts Institute of Technology*, 1951, 98 pages. (QC544.V3 M38t)

Presents a manual of procedures used in tube development at M.I.T. Includes degreasing and cleaning of metal and other tube parts, electroplating Ni, Cu, Ag, Au, Pt, and stainless steel, hydrogen brazing and heat treatment, and various tube laboratory procedures. General information on materials used is given in tabular form.

2268 Theory and Applications of Wave Vectors. F. Dahlgren. *Transactions of the Royal Institute of Technology*, no. 51, 1951, 67 pages. (T4 R81t)

Presents general expressions for the above. Application on rotating electric machines is given.

Books

2269 Electronics. Ed. 2. Jacob Millman and Samuel Seely. 598 pages. 1951. McGraw-Hill, New York. (TK7815 M63e2)

A textbook suitable for courses in which the emphasis is on fundamental theory and the physics of electronic devices as well as those courses in which the principal objective is to study technical and engineering applications of these devices. Radio-frequency amplifiers, modulators, detectors, and oscillllators (except those of the relaxation type) have been omitted. Chapter problems and references.

See also:

1338 (nonuniform current flow—effect on contact resistance)
1515 (servo characteristics of rectifier-driven motor)
1516 (study of transient electrical phenomena)
1521 (electronic computers—Fortune article)
1525 (electrical instrument design)
1526 (electrical-instrument defects)
1527 (electrical-instrument components)
1533 (vacuum tubes for instruments)
1576 (circuits for a.c. servomechanisms)
1582 (Al as electrical conductor)
1592 (corona discharge in electrical precipitation)
1691 (electronics of guided missiles)
1699 (pulse-time modulation telemetering systems)
2314 (economics of high-voltage transmission)

34. GRAPHIC ARTS

2270 Chromatographic Investigations Related to Photographic Theory. T. H. James and W. Vanselow. *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5617-5622.

Elution chromatography has been applied to the separation of a series of photographic sensitizing and desensitizing dyes, using silver bromide as the adsorption medium and aqueous pyridine solutions as the chromatographic developer.

2271 Crystallization Phenomena. Nat Rosen, chairman. *American Ink Maker*, v. 29, Dec. 1951, p. 37-38, 65.

There are two types of crystallization. One is the "surface-tension" type wherein the second color "crawls" and does not print satisfactorily over the first color. In the other type, the second color prints satisfactorily over the first but does not adhere and can be scratched off very readily. The above is concerned with the "surface-tension" type of crystallization. Data are tabulated.

2272 New Photoengraving Process Eliminates Need for Darkroom. *Business Week*, Dec. 15, 1951, p. 50-52.

Describes a method that chemically reproduces photographs, blueprints, or printed matter on almost any type of sheet material. It was developed by Trans-Gel Products, Inc., Queens Village, N.Y.

2273 From LTF: Research Progress No. 23. *Graphic Arts Monthly and the Printing Industry*, v. 23, Dec. 1951, p. 78, 80, 82, 84.

Describes tests made by the Lithographers Technical Foundation on the effect pH had on the shelf life of bichromated printing-plate coatings.

2274 Photos on Aluminum Resist Heat and Scratching. Eugene Wainer. *Iron Age*, v. 168, Dec. 20, 1951, p. 104-105.

Shows that pictures, nameplates, and drawings reproduced photographically on aluminum have a hard, scratch-resistant, glass-like surface. The image is substantially grainless and halftones may be faithfully reproduced. The method uses photographic and anodic processes. Use of dyes gives many rich color effects.

2275* Transparent Proofs From Type Forms. Parts II and III. (Concluded.) Morris S. Kantrowitz, Arthur A. Dillon and Earl J. Gosnell. *Modern Lithography*, v. 19, Nov. 1951, p. 40-42, 117, 119, 121; Dec. 1951, p. 31-33, 101.

Considers details of the above such as inspection of proofs and equipment, retouching, and cleaning of transparent proofs.

2276* Details of New Recording Densitometer. George W. Jorgensen. *Modern Lithography*, v. 19, Dec. 1951, p. 38-40.

Describes the above which is still in its development stage. The density of any color ink can be measured by this equipment.

34. *Graphic Arts*

2277* Lithographic Dot Contour. Part 2. (Concluded.) I. M. Bernstein. *Modern Lithography*, v. 19, Dec. 1951, p. 40-42.

Summarizes an investigation on the above showing that plate grain and blanket resiliency are the major factors affecting the above.

2278* Static Elimination. Lewis E. Walkup. *Modern Lithographer and Offset Printer*, v. 47, Nov. 1951, p. 212, 214.

Discusses the above with reference to printing machines. Deals with difficulties due to and means of eliminating static electricity.

2279* Graining of Lithographic Plates. Frank E. England. *National Lithographer*, v. 58, Dec. 1951, p. 28-29.

Gives the essential components for graining Zn or Al plates. Discusses abrasives that can be used and describes the graining and regraining procedures.

2280* Pigment Dyestuffs and Litho Inks—The Significance of pH Measurement. J. Keaton. *Journal of the Oil & Colour Chemists Association*, v. 34, Dec. 1951, p. 586-590; disc., p. 590-591.

Presents results of an investigation to determine the reason for emulsion break-down or reversal, of lithographic inks during printing.

2281* Infra-Red Drying Steps Up Efficiency. Francis A. Westbrook. *Printing Equipment Engineer*, v. 82, Dec. 1951, p. 61-64.

Describes and illustrates equipment and procedures for the above, applied to various phases of the graphic-arts industry.

Books

2282 Lenses in Photography; The Practical Guide to Optics for Photographers. Rudolf Kingslake. 246 pages. 1951. Garden City Books, Garden City, New York. (TR270 K61L)

Stresses the design aspects of cameras and other pieces of equipment. Treats the subject of lenses and their aberrations rather fully, also photometry and the theory of image brightness. 36 ref.

2283* The Use of Resinous-Copper Complexes in Printing. Albert P. Royle. *American Dyestuff Reporter*, v. 41, Jan. 7, 1952, p. 15, 24.

Concerned with the discharging and the application printing of direct colors on textiles, which are benefited by after treatment with a resinous-copper complex. Processing problems are discussed and methods are suggested by means of which clear whites and prints with excellent fastness properties are obtained.

See also:
1804 (British printing-ink research)
2016 (plastic printing plates)
2133 (capacitance changes of Se rectifiers)

35. STATISTICS AND ECONOMICS

2284 The Growth of Vinyl Chloride. D. S. Plumb and Ralph F. Hansen. *Chemical and Engineering News*, v. 29, Dec. 24, 1951, p. 5432-5434.

An analysis of the economic trends of the vinyl-resin industry, broken down into the individual components—sheeting and film, molding and extrusion, textile and paper coating, and polyvinyl acetate resins.

2285 Foreign Trade. L. N. Markwood. *Chemical and Engineering News*, v. 30, Jan. 7, 1952, p. 26-29.

Statistical review covering chemicals and allied products for Jan.-Sept. of 1950 and 1951.

2286 Economic Comparison of Energy Differences. A. P. Fugill. *Electrical Engineering*, v. 71, Jan. 1952, p. 81. (A condensation; to be published in *AIEE Transactions*, v. 70, 1951:)

Determines the amount of energy involved in the different schemes being compared, and the money value of that energy. The fundamental principle is to determine for each scheme, as accurately as possible, the actual cost of the losses which will accrue during the life of the facility.

2287* World Supply of Non-Ferrous Metals. R. Lewis Stubbs. *Engineering*, v. 172, Nov. 30, 1951, p. 702-703; Dec. 7, 1951, p. 732-734.

Presents data on production and consumption of all the major nonferrous metals; namely, Cu, Zn, Sn, Al, Mg. Allowance is made for the role of scrap, the amount of which continues to rise in increasing proportion with the rise in the consumption of the virgin metal. Data are tabulated.

2288 Future of Minerals in Structural Products. John D. Sullivan. *Engineering Experiment Station News*. (Ohio State University), v. 23, Oct. 1951, p. 3-4, 27-29.

Discusses ceramics, Al and Mg alloys, Ti, and other structural materials with respect to their role in national economy, application in jet planes, resistance to corrosion, the critical supply situation, and its alleviation through synthetics and ingenuity.

2289 Mineral Forecast. Edward Steidle. *Engineering Experiment Station News* (Ohio State University), v. 23, Oct. 1951, p. 5-6, 30-37.

Discusses production and consumption trends of mineral products. Covers demand, supply, resources and availability. Stresses the basic energy problem with the aim of stimulating long-range planning by those directing research programs.

2290 Utilization of Lime as a Natural Resource of Ohio. L. E. Johnson. *Engineering Experiment Station News* (Ohio State University), v. 23, Oct. 1951, p. 13-14, 41-42.

Discusses history, economy, quality, and research on the above.

2291 Markets—Trends and Prices. *Engineering and Mining Journal*, v. 153, Jan. 1952, p. 68-69.

Tabulated data and brief discussions on prices and output for major metals, miscellaneous metals, ores, and minerals.

2292 Foundry Statistics. *Foundry*, v. 80, Jan. 1952, p. 161.

Gives tabulated information on shipments of various types of castings and materials, production workers, coke and pig iron production and consumption, and iron and steel scrap consumption.

2293* Nonferrous Metals in the 6-Year Plan. (In Polish.) Boleslaw Chudzio. *Hutnik*, v. 17, Nov.-Dec. 1950, p. 406-410.

Outlines developments planned for the next 6 years in Poland. Includes plans for development of native Sn-Pb, Cu, and Ni ores; beneficiation and smelting problems; refining and fabrication problems; rolling; and training programs.

2294 Status of Chemical Industry—1951. G. L. Parkhurst. *Industrial and Engineering Chemistry*, v. 43, Dec. 1951, p. 2648-2650.

Pertains to the western states. Includes table showing production of representative chemicals, and graph showing growth of chemical industry.

2295 Raw Material Availability. A. C. Byrns and Fred Lohse. *Industrial and Engineering Chemistry*, v. 63, Dec. 1951, p. 2650-2656.

Covers petroleum and natural gas, coal, sulfur, inorganic salts, metallic ores, minerals, forest, and agricultural products in the West.

2296 Induction and Gas Furnace Melting Costs Compared. Stewart C. Parker. *Iron Age*, v. 168, Dec. 27, 1951, p. 62-65.

The use of low-frequency induction furnaces and gas furnaces in the die-casting industry is evaluated. Commercial types are described and discussed. Cost and operational data are tabulated.

2297 Defense Controls Guide. *Iron Age*, v. 169, Jan. 3, 1952, p. 327-334.

Digests principal material control orders affecting the metal-working industry, lists CMP regulations and NPA forms, revised to Dec. 15, 1951. Also a list of controls officials with their room and telephone numbers. Four pages list principal metal products bought by the armed forces and locations of the buying offices.

2298 *The Iron Age* 1952 Metal Industry Facts. *Iron Age*, v. 169, Jan. 3, 1952, p. 381-476.

Includes sections on: steel industry, nonferrous metals, raw

materials, metal products, and casting, forging, machinery, market data, labor and safety. Extensive tabular data.

2299 Metalworking Meetings Scheduled for 1952. *Iron Age*, v. 169, Jan. 3, 1952, p. 512-514, 516.

Technical meetings, conventions and expositions on various phases of metalworking and metal production.

2300 The Zinc Consumer Industry, 1949-51. B. Walters. *Metallurgia*, v. 44, Dec. 1951, p. 295-298.

Surveys the above. Emphasizes making the best use of the metal available, and thus releasing further supplies for possible future uses. 14 ref.

2301* The Distribution of Radioactivity. C. F. Davidson. *Mining Magazine*, v. 85, Dec. 1951, p. 329-340.

Surveys radioactive mineral resources of the accessible crust of the earth. 26 ref.

2302* World Production at All-Time High. Dahl M. Duff. *Oil and Gas Journal*, v. 50, Dec. 20, 1951, p. 229-231.

Discusses trends in world-wide production of crude oil. Tabulated statistical data.

2303* Journal's International Survey of Oil Fields. *Oil and Gas Journal*, v. 50, Dec. 20, 1951, p. 335-346.

Statistical information is given on each field.

2304* Journal's International Survey of Oil Refineries. *Oil and Gas Journal*, v. 50, Dec. 20, 1951, p. 348-352, 355.

A statistical listing, giving name, location, type, and capacity of plant.

2305* The Geography of Steel. George H. T. Kimble. *Scientific American*, v. 186, Jan. 1952, p. 44-53.

Presents general account of the raw-materials situation throughout the world. Explains, in simple terms, how steel is made.

2306 Organization of Research in Africa. E. B. Worthington. *Scientific Monthly*, v. 74, Jan. 1952, p. 39-44.

Outlines the above.

2307* 1951 Vessel Shipments of L. S. Iron Ore Totaled 89,092,012. *Skillings Mining Review*, v. 40, Dec. 22, 1951, p. 1-2.

Brief discussion of the above, and graph indicating shipments year by year since 1885. Table shows shipments from different upper-lake ports.

2308 How to Do Business Under Government Controls. *Steel*, v. 130, Jan. 7, 1952, p. 127-137, 518, 520, 522, 525, 526.

Presents digests of production controls affecting the metalworking industry.

2309 1952 Metalworking Facts and Figures. *Steel*, v. 130, Jan. 7, 1952, p. 167-214.

Contents encompass raw materials all the way through the end products of the metal consuming industries. Also, such related subjects as labor, prices, and earnings are covered.

2310* There's Coal in Your Future. George A. Lamb, D. L. McElroy, and Joseph Pursglove, Jr. *Utilization*, v. 5, Dec. 1951, p. 29-38.

Envisions vastly broadening horizons for coal, using the measurable factors of past growth and progress in determining the extent to which coal will contribute to the expanding economy. Tells why coal might be expected to attain an unprecedented output of a billion tons a year by 1975.

2311* World Wide Horizons for Coal. A. Wyn Williams. *Utilization*, v. 5, Dec. 1951, p. 43-46.

Discusses the above in view of acceleration of world-wide industrial development, accompanied by growing demands for energy fuels and metallurgical coke, and a deficiency of coal output in most areas of the world except the U.S.

2312* The Aluminum Situation. J. H. DeKlyn. *Wire and Wire Products*, v. 26, Dec. 1951, p. 1137-1139, 1191-1193.

Presents economic analysis of the above. Statistics and predictions.

2313* The Communications Wire Program of the Signal Corps. Howard F. Cleary. *Wire and Wire Products*, v. 26, Dec. 1951, p. 1141-1142, 1180.

Gives information on the methods and manner of procurement of communications wire and cable by the Signal Corps, the general existing requirements of the main classes of wire and cable, and the prospects of requirements in the immediate future of primary items. Also presents information concerning research and development work.

Miscellaneous Publications

2314 System Economics of Extra-High-Voltage Transmission. H. P. St. Clair and E. L. Peterson. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 1, 1951, p. 841-848; disc., p. 848-851. (TK1 Am35tr)

Discusses the selection and application of high-voltage transmission on an economic basis. Data are graphed. 12 ref.

2315 Impact of Defense Activities on Petroleum Fuel Supplies. Adam K. Stricker, Jr. American Society of Mechanical Engineers, Advance Paper 51-A-148, 1951, 79 pages. (TJ1 Am35p)

Surveys the above. Data are tabulated and graphed.

2316 Production, Consumption, and Use of Fuels and Electric Energy in the United States in 1929, 1939, and 1947. William H. Lyon and D. S. Colby. U. S. Bureau of Mines, Report of Investigations 4805, 90 pages. (TN21 Un3r)

A comprehensive statistical report on the above, presented in tabular form and on a uniform basis.

Books

2317 Bituminous Division. Annual Report. 325 pages. 1950. Dept. of Mines, Commonwealth of Pennsylvania, Harrisburg, Pa. (TN806 P38r)

Presents data in tabular form on production of coal and coke in various districts of Pennsylvania.

See also:

1102 (marketing of Taconite)
1129 (secondary-Al and Mg industry)
1574 (analogue computing techniques in economics)
1617 (economics of coal liquefaction and gasification)
1641 (anthracite industry)
1644 (coal economics—Bureau of Mines report)
1647 (fuel and power resources—Sweden)
2004 (economics of plastic materials)
2009 (plastics—economic review)

36. MISCELLANEOUS

2318 Coke Oven Cost Analysis. W. B. Knuff. *Blast Furnace and Steel Plant*, v. 39, Dec. 1951, p. 1477-1480, 1491.

Discusses the need in industry for the above. Outlines the procedure employed by Republic Steel Corp., in obtaining production data.

2319 Metals Industry. I. E. Campbell. *Chemical and Engineering News*, v. 30, Jan. 7, 1952, p. 34-36.

Reviews economic and technical developments of 1951 in the above under the headings: Ti, Zr, Mo, V, Cr, Al, Mg, Cu, Sn, Ni, Co, iron and steel, and ceramic-metal combinations.

2320 Accomplishments of Research in the Petroleum Industries. Everett C. Hughes. *Engineering Experiment Station News* (Ohio State University), v. 23, Oct. 1951, p. 9-12, 40-41.

2321* *Foreign Affairs.* Published quarterly by Council on Foreign Relations, Inc., 58 E. 68th St., New York 21, N. Y.

Articles discuss various aspects of the above. Many are by well-known individuals such as Paul H. Dougles, Hanson Baldwin, or Vincent Sheean.

2322* Isotopes—The 1954 Sterilizer? *Glass Packer*, v. 30, Dec. 1951, p. 859-860, 906-907.

Anticipates sterilization uses for waste fission materials produced in atomic bomb plants. Concludes that this will be commercially practical for heat-sensitive pharmaceuticals, food and beverages, and hospital supplies. Presents cost studies, infor-

36. *Miscellaneous*

mation on processing the waste, and an outline for the possible processing of penicillin by this method.

2323 Technical Trends; Ingenuity Must Overcome Shortages in 1952. D. I. Brown. *Iron Age*, v. 169, Jan. 3, 1952, p. 243-259.

A summary covering a selected group of developments of 1951, in the metal-working industry. 27 ref.

2324 National Trade Associations and Technical Societies. *Iron Age*, v. 169, Jan. 3, 1952, p. 478, 480, 482, 484-486, 488, 490.

A list of some 200 professional and technical societies and trade associations in metalworking and metal production.

2325 Titanium, Zirconium, Molybdenum, Tungsten, Tantalum, Columbium, Vanadium, Hafnium as Engineering Materials. John L. Everhart. *Materials & Methods*, v. 34, Dec. 1951, p. 89-104.

A series of comprehensive articles on the above. Discusses their engineering properties, forming and machining characteristics, weldability, cleaning and finishing characteristics, and present and potential uses. Tabulated and illustrated data.

2326 Less Familiar Metals of Commercial Importance. Robert A. Lubker. *Mechanical Engineering*, v. 74, Jan. 1952, p. 3-8, 18.

Discusses the availability, production processes, properties, alloys, cost, and uses of twenty metals which are relatively uncommon but of appreciable or potential industrial importance.

2327 Secondary Heavy Metals. E. H. Jones. *Metal Industry*, v. 79, Nov. 30, 1951, p. 457-459.

Surveys primary and secondary reserves of metals available for existing needs. Technical improvements in scrap recovery are discussed.

2328 Metallurgy at the Bureau of Standards in the Past 50 Years. John G. Thompson. *Metal Progress*, v. 60, Dec. 1951, p. 51-57.

Surveys the above. The original organization consisted of 6 divisions concerned with the establishment and maintenance of standards in the fields of electricity, weights and measures, heat and power, optics, chemistry and mechanics. Accomplishments in recent years are shown.

2329* Zirconium—An Old New Metal. Harold J. Read. *Mineral Industries*, v. 21, Dec. 1951, p. 3, 6.

Detailed discussion of the above metal. Covers difficulty in extracting it from the ore, methods of refining, adverse affect of impurities, applications, uses, and advantages over Ti and other metals.

2330* Man of the Year: Young Mister Magnesium. F. L. Church. *Modern Metals*, v. 7, Dec. 1951, p. 24-25, 27-28, 30-32, 34, 36.

Surveys the progress of the Mg industry to date. Describes the fabrication of a Mg carrying case. Includes brief discussion of the practices of the die-casting department.

2331 Materials for High-Temperature Use. Clyde Williams. *Monthly Business Review*, v. 34, Jan. 1952, p. 16.

Surveys recent developments in the above, including metals, alloys, ceramics, and their combinations.

2332 Molybdenum: Our Most Promising Refractory Metal. J. J. Harwood. *Product Engineering*, v. 23, Jan. 1952, p. 121-132.

Discusses properties and applications of the above at some length. Includes sections on mining and production methods, physical and mechanical properties, high-temperature properties, oxidation and corrosion, fabrication and processing, welding, alloy compositions, and applications. 14 ref.

2333* On the Non-Linear Vibration of Elastic Bars. A. Cemal Eringen. *Quarterly of Applied Mathematics*, v. 9, Jan. 1952, p. 361-369.

Reformulates the problem of vibration of bars, ignoring the classical theory which assumes that the deflection is small and inextensional, and that supports are free to move in the axial direction. Problems to which the classical theory is not applicable can now be attacked.

2334 Pure Vanadium; A Promising Engineering Material. *Steel*, v. 129, Dec. 31, 1951, p. 52-55.

Surveys fabricating, mechanical, and physical characteristics of the above. The metal also has high salt-water corrosion resistance and negligible magnetic susceptibility. Stress-strain diagrams for the pure metal are given.

2335* Ore Potentials for an Expanding Steel Industry. R. G. Paul. *Western Machinery and Steel World*, v. 42, Dec. 1951, p. 89-91.

Surveys trends in the iron and steel industry as regards ore resources. Exploration and development of new ore sources at home and in foreign countries are discussed.

Miscellaneous Publications

2336 Management of Industrial Research. James C. Zeder. *Transactions of the American Foundrymen's Society*, v. 59, 1951, p. 1-6. (TS200 Am35t)

Surveys the above. The importance of research in industry today is emphasized. Functions of a research director are discussed.

2337 Thirtieth Annual Report for the Year Ending June 30th, 1951. British Cast Iron Research Association, Oct. 1951, 24 pages. (TN710 B77an)

Presents a brief survey of the research work carried on by the above organization.

2338 The Montecatini Concern and Its Activities. Montecatini Societa Generale Per l'Industria Mineraria e Chimica, (Milan, Italy), 70 pages. (Pamphlet File.)

Describes the above which is the most powerful industrial organization in Italy, and occupies a position of the highest importance among the world's biggest industrial enterprises working in the field of mining and chemical production. Illustrations.

2339 Water in Industry. National Association of Manufacturers and the Conservation Foundation, Dec. 1950, 51 pages. (TD223 N21w)

Surveys the above. Includes a brief discussion on the treatment of waste water and treatment of water for use. Data are tabulated and graphed.

2340 Domestic Mica. G. Richards Gwinn. U. S. Bureau of Mines, Information Circular 7617, Nov. 1951, 37 pages. (TN21 Un3i)

Describes various types of mica, their occurrence, preparation for market, and applications. Data are tabulated. 26 ref.

2341 Bibliography on Titanium. Jean Richards Carpenter and Gwendolyn Werth Luttrell. U. S. Geological Survey, Circular 87, Jan. 1951, 19 pages. (Z5524.T6 C22b)

Includes, in general, the more significant publications on Ti issued to Jan. 1, 1950, although one or two important papers issued since that date have been added. The papers are listed by issuing organizations—Federal and State Bureaus—and by various groups of publications—books, and scientific and industrial journals.

Books

2342 Human Engineering. L. E. Abt, chairman. *Annals of the New York Academy of Sciences*, v. 51, Art. 7, Jan. 31, 1951, p. 1123-1278 (Q11 N49a)

A series of papers by various authors. Presents results of experiments and investigations endeavoring to match human beings with modern machines so that their combined output will be comfortable, safe, and more efficient.

2343 Selective Toxicity. Adrien Albert. 228 pages, 1951, John Wiley & Sons, Inc., New York. (RM663 A14s)

The above is concerned with drugs, weed-killers, and insecticides. Some applications of these toxic materials are discussed as well as their scientific aspects.

2344 Oil-Field Exploration and Development. Vol. I. Oil-Field Principles. Vol. II. Oil-Field Practice. Ed. 2. A. Beeby-

Thompson. 1241 pages. 1950. Technical Press, Ltd., London. (TN870 T37o2)

Discusses the origin and distribution of petroleum. Presents notes on oil-field legislation and customs.

2345* Materials Handbook. George S. Brady. 913 pages. 1951. McGraw-Hill, New York. (TA403 B72m7)

Presents general information, with the most commonly used comparative figures on materials in their group classifications in order to give a general picture. Patented and trade-named materials are described to give a more specific understanding of commercial applications. The relative position and the length of description of proprietary materials are for purposes of illustration and bear no relation to the relative merits of the products of any one producer.

2346 Die Sowjetunion; Natur, Volk und Wirtschaft. (The Soviet Union; Nature, People, and Economy). Werner Leimbach. 526 pages. 1950. Franckh'sche Verlagshandlung, Stuttgart, Germany. (HC331 L53s)

This book contains comprehensive information on the geography, meteorology, natural and human resources, political subdivisions, economy, industry, commerce, transportation, and communication systems of the U.S.S.R. Numerous photographs, maps, and tables. Also includes a bibliography of 200 references and a supplement on the numerous governmental departments.

2347* Handbook of Dangerous Materials. N. Irving Sax, M. J. O'Herin, and W. W. Schultz. 848 pages. 1951. Reinhold Publishing Corp., New York. (TP149 S98h)

A digest of the available literature concerning the hazardous properties of some 5,000 materials. Includes empirical formulas, molecular weights, taste, odor, and appearance; as well as other physical and chemical data. Discusses not only ordinary chemical hazards, but hazards due to explosives, fungi and fungicides, and radioactivity. Includes up-to-date set of I.C.C. shipping regulations. Presented in non-technical language wherever possible.

2348 Accident Prevention Manual for Industrial Operations. Ed. 2, Unpaged. 1951. National Safety Council, Chicago. (T55 N21a2)

Presents a comprehensive source of the "how" of industrial safety. Chapters take up specific groups of equipment or types of hazards.

2349* Chemical Manufacturers' Directory of England, Wales & Scotland, With Some of the Firms in Ireland. 82nd ed. 194 pages. 1950. Newnham, Cowell & Gripper, Ltd., City Road, London. (Directory Shelf.)

2350 Fourteenth Technical Conference on Petroleum Production. 265 pages. 1950. Pennsylvania State College, State College, Pa. (Bulletin 56.) (Tn21 P38b)

Compilation of papers presented at the above. Includes experiments with chemical tracers, selective plugging, porosity measurement, role of clays in electrical conductivity, and others.

2351 Narodnoe Khozyaistvo SSSR. (National Economy of the U.S.S.R.) Vol. 3. 448 pages. 1950. Gosplanizdat (State Planning Publishing House), Moscow. (HC335 N16)

This collection includes articles from the Russian journals *Bolshevik, Planned Economy, and Economic Problems* and also official material concerning the development of the national economy since 1949.

2352 Tables Relating to Mathieu Functions; Characteristic Values, Coefficients, and Joining Factors. 278 pages. 1951. Columbia University Press, New York. (QA55 Un3t)

Prepared by the Computation Laboratory, National Applied Mathematics Laboratories, National Bureau of Standards. 29 ref.

See also:

1407 (properties of 25-12 Cr-Ni steel)
1600 (Aersol studies at Georgia Tech)
1978 ("Histamine Antagonists"—book)
2313 (Signal Corps research on communications wire)

RECENT PAPERS BY THE RESEARCH STAFF*

Uranium Sesquicarbide, M. W. Mallett, A. F. Gerds, and D. A. Vaughan. *Journal of the Electrochemical Society*, December, 1951.

Precise Temperature Control, C. F. Rains and R. C. McMaster. *Electrical Manufacturing*, December, 1951.

Constitution of Titanium-Aluminum Alloys, H. R. Ogden, D. J. Maykuth, W. L. Findlay, and R. I. Jaffee. *Journal of Metals*, December, 1951.

Battelle Research Aids Market Gardeners, F. A. Gilbert. *Market Growers Journal*, January, 1952.

Static Elimination, L. E. Walkup. *Modern Lithographer and Offset Printer*, November, 1951.

Producer Gas for Gas Turbines, H. W. Nelson, A. Y. Hillman, Jr., and B. O. Buckland. *General Electric Review*, December, 1951.

Plastics, E. E. McSweeney. *Chemical and Engineering News*, January 7, 1952.

Metals Industry, I. E. Campbell. *Chemical and Engineering News*, January, 7, 1952.

Films Derived From Styrene-Maleic Anhydride and Styrene-Monoethyl Maleate Heteropolymers; Solubilities and Constitution, R. G. Heiligmann and E. E. McSweeney. *Industrial and Engineering Chemistry*, January, 1952.

Rare Earths Increase High-Temperature Properties of Magnesium, K. Grube. *Iron Age*, January 17, 1952.

Solubility of Ethylene in Water; Effect of Temperature and Pressure, E. J. Bradbury, Dorothy McNulty, R. L. Savage, and E. E. McSweeney. *Industrial and Engineering Chemistry*, January, 1952.

In most cases reprints will be available upon request to the Editor.

Notes From Battelle

RADIOACTIVE TETRAETHYLLEAD

Radiochemists at Battelle have prepared what is believed to be the first radioactive form of tetraethyllead. Tetraethyllead-1-C^{14} was synthesized by the action of ethyl magnesium iodide-1-C^{14} on triethyllead bromide. Assay by both chemical and radiochemical methods showed the radioactive tetraethyllead formed to have a minimum purity of 95 per cent.

It is believed that the radioactive form of the well-known anti-knock gasoline additive will be useful in combustion research. While some of the mechanical details of the effect of tetraethyllead on the burning of gasoline in internal combustion engines is known, very little has been determined about what happens chemically. The radioactive form will permit the fate of carbon atoms to be followed during the oxidation process.

Battelle radiochemists are working on the preparation of a radioactive form of hexane. This radioactive compound will be used in delving further into the chemistry of fuel oxidation and combustion.

* * *

METAL RESOURCES

The metal resources of the free nations of the world give them an economic and military advantage, John D. Sullivan, assistant director of Battelle, pointed out in a talk given before the Colorado Mining Association recently.

"The free nations," he stated, "can produce 82 per cent of the world's iron and steel, 85 per cent of the world's aluminum, 95 per cent of the world's molybdenum, 86 per cent of the world's nickel, and 92 per cent or more of the world's copper, lead, and zinc. Although in 1949 the free nations mined only 49 per cent of the world's output of manganese ore (this may be increased to 60 per cent in 1952), we made and used 80 per cent of the ferromanganese production."

To take advantage of this enviable position in respect to metals supply, greater production of end products within the free nations is needed, Mr. Sullivan said. Of the present free nations, the United States, Great Britain, France, and Italy have borne the burden in refining and fabrication in past wars. Expansion of processing and manufacturing facilities in these and in other free nations would enable countries outside the Soviet orbit to realize the economic and military advantages of their favorable metals supply.

NEW COMPUTING LABORATORY

A mathematical computing laboratory has been established at Battelle. Its equipment includes a battery of digital computers, to which will be added analog computers that are now being designed and built.

According to Battelle Physicist H. R. Nelson, the services of the new laboratory are expected to conserve much time for those in research and industry. "Mathematics, of course, can sometimes reduce or even replace costly experiments. Mathematical computing machinery may be particularly useful in problems of engineering design and quality control, in analysis of crystal structure, and in the determination of aerodynamic coefficients, trajectories, and other data for scientific tables."

Mr. Jack Belzer, formerly in charge of punch-card computing at both the United States Naval Observatory and Ohio State University, will conduct much of the work of the laboratory.

* * *

GILLETT MEMORIAL LECTURES

The American Society for Testing Materials has announced the establishment of an annual H. W. Gillett Memorial Lecture. The purpose of this lecture, which is being sponsored in cooperation with Battelle, is to commemorate Howard W. Gillett, who was one of America's leading technologists, the first director of Battelle, and an active worker for many years in the ASTM.

The memorial lecture will be delivered annually at a meeting of the society, and the first at the ASTM's 50th Anniversary Meeting in New York City during the week of June 23, 1952. The lecturer will cover a subject pertaining to the development, testing, evaluation, and application of metals, in which fields Dr. Gillett was particularly interested. An honorarium is provided, and the lectures will be published and disseminated.

* * *

SCIENCE OF PREDICTION

Engineering economics is becoming of increasing interest to industry as a science of prediction of technical-economic opportunities and risks. When used to the fullest extent, it can do many things—such as locate a new plant, foretell a new market, forewarn

of a competitive danger, approve or disapprove an investment, plot a straight-line program of technical research, show open roads to new profits, or instigate production changes. It is a scientific method of cutting through the maze of engineering and economic variables that complicate management planning.

Battelle recently has published a booklet describing its engineering economics research. The booklet defines this relatively new subject, points out how it aids management planning, and outlines the scope of the Institute's work in the field. Subjects discussed include industrial market research, raw material studies, diversification studies, research planning, operations research, and industrial logistics and plant location. Copies of the booklet are available upon request.

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HOT MACHINING METALS

Although it has been long accepted practice in machining to use coolants on the cutting tool and workpiece, experiments have established that the machinability of some metals is greatly improved at elevated temperatures.

By using an arc struck between the work and a carbon electrode to provide localized heating, Battelle engineers have been able to machine with relative ease such metals as Vitallium, austenitic manganese steels, high-temperature alloys, and fully hardened high-speed steel.

Vitallium, turned at 2000° Fahrenheit, machines freely to form long, curling chips. The machined surface was smooth and uniform, and satisfactory tool life was achieved. In contrast, Vitallium turned at room temperature produced powdery chips and a glazed and rough work surface, and tool life was short. Austenitic manganese steel gave similar good results when turned and drilled at temperatures above 1250° Fahrenheit. Since the heat source is intense and concentrated on the surface, fully hardened high-speed tool steel can be machined without changing the hardness of the workpiece.

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IMPROVED CHINAWARE GLAZE

An improved process for the production of more brilliant and attractive glazes on chinaware for use in public and institutional eating places has been developed by Battelle ceramists. The new glaze is said to be as attractive as those found on art objects, yet like conventional types, it can be treated with considerable roughness without damage, and it is highly resistant to chemical attack. The glaze is especially compatible with underglaze colors during firing, thus making possible even wider use of decorations and colors in the manufacture of institutional chinaware. Uniformity of glaze is greatly improved by the new process.

The research at Battelle leading to the improved glaze-making process was sponsored by the Vitrified China Association, whose membership includes the country's leading chinaware manufacturers.

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Hold fast to that which is good; but change to that which is better — what stops growing starts to die. — *F. P. Seiberling,* President, Seiberling Rubber company.

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In Science you must not talk before you know.—*John Ruskin.*